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THE POTENTIAL BENEFITS OF USING  
VIDEO TELECONFERENCING AT  
AFLC/HQ TO CONDUCT TRAINING

THESIS

Gregory A. Stewart  
Captain, USAF

AFIT/GIR/LSR/89D-10

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THE POTENTIAL BENEFITS OF USING VIDEO  
TELECONFERENCING AT AFLC/HQ  
TO CONDUCT TRAINING

THESIS

Presented to the Faculty of the School of Systems and Logistics  
of the Air Force Institute of Technology  
Air University  
In Partial Fulfillment of the  
Requirements for the Degree of  
Master of Science in Information Resource Management

Gregory A. Stewart, B.A.

Captain, USAF

December 1989

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I also wish to thank the interview participants by last name: Brodockwell, Charles, Gallico, George, Heroux, Moore, Snowden, and Williams. The locations for these individuals can be obtained from Appendix C: List of Interviewees.

This paper is presented in memory of my father, Charles W. Stewart, Sr., brother, Robert K. Stewart, and cousin, Russell Bennett.

Finally, I wish thank my wife Carmen for typing, motivation, support, and understanding and other family members for their support throughout this entire thesis effort.

Captain Gregory A. Stewart

## Table of Contents

	Page
Acknowledgments .....	ii
List of Figures .....	vi
List of Tables .....	vii
Abstract .....	viii
I. Introduction .....	1
General Issue .....	1
Background .....	2
Problem Statement .....	5
Investigative Questions .....	5
Definition of Terms .....	5
Limitations of Study .....	7
Assumptions .....	7
Summary .....	8
II. Literature Review .....	9
Introduction .....	9
Government Agencies' Use of Teleconferencing Technology .....	9
DOD Video Teleconference Users Group .....	9
Navy Research on Teleconferencing .....	10
Navy Operational Teletraining Facility .....	15
Army Research on Use of Teletraining .....	16
FBI Use of Teletraining .....	16
Military Students' Attitudes Towards Instructional T.V. ....	17
Teleconferencing at the United States Department of Agriculture .....	20
Aeronautical Systems Division Teleconferencing Center .....	20
Summary of Government Users .....	21
Information Systems Consideration .....	22
Private Sector Use of Teleconferencing Technology .....	24
Successes and Failures of Teleconferencing Technology .....	24
Impact of Telecommunications on Business Competition .....	29
Logistics Possibilities of Teleconferencing .....	30
NUTN/NTU Teletraining .....	33
Courses Offered on	

	Page
Teleconferencing Networks .....	35
McDonald's Use of Videotape Since 1971 .....	35
Training at Motorola, Ford, DEC, J.C. Penney, and AMI .....	36
Teletraining Considerations for Instructors and Students .....	36
Teletraining Teaching Considerations .....	37
Teletraining as an Alternative .....	38
Conclusion .....	41
III. Methodology .....	44
Methods .....	44
Library Method .....	44
Interview Method .....	45
Conclusion About Use of Experts .....	46
Methodology Justification .....	47
Researcher Training .....	47
Expected Benefits of the Research .....	47
Summary .....	48
IV. Findings .....	49
Introduction .....	49
Investigative Question 1 .....	49
Investigative Question 2 .....	51
Interview Questions 1, 2, and 3 .....	51
Interview Question 4 .....	53
Interview Question 5 .....	54
Interview Question 6 .....	54
Interview Question 7 .....	55
Interview Question 8 .....	56
Interview Question 9 .....	57
Interview Question 10 .....	57
Summary .....	58
V. Conclusions and Recommendations .....	59
Introduction .....	59
Conclusions .....	59
Investigative Question 1 .....	59
Investigative Question 2 .....	62
Suggestions for Future Research .....	63

	Page
Recommendations .....	64
Summary .....	65
Appendix A: Interview Questions .....	66
Appendix B: Letter to Participants .....	67
Appendix C: List of Interviewees .....	69
Appendix D: Facsimile and Written Interview Responses .....	70
Appendix E: Smeltzer Study Results From Naval Thesis .....	86
Bibliography .....	87
Vita .....	90



## List of Figures

Figure	Page
1. Map of Defense Commercial Telecommunications Network (DCTN) AFLC Site Locations .....	4
2. Electronic Conferencing Opinions .....	32

### List of Tables

Table	Page
I. Cost Avoidance Breakdown By Air Logistic Center (ALC) .....	3
II. Failure Factors In Teleconferencing .....	28
III. Potential Benefits of Using AFLC's VTCN to Conduct Training .....	50
IV. Establishment of Expertise .....	52
V. Types of Training and Organizations .....	53
VI. Student Retention Span With Teletraining .....	54
VII. Types of Courses Applicable to Teletraining .....	55
VIII. Personnel Being Trained in Organizations .....	57

Abstract

Rising costs for conducting training in support of the Air Force mission could result in compromising the readiness of personnel. With limited resources and spending priority conflicts, Air Force managers seek solutions offering reduced costs, improved productivity, and increased employee job satisfaction. Based on new technological advancements in the field of teleconferencing, and the proven benefits/results from limited use of teleconferencing technology, a new/alternative method for conducting training, "teletraining using teleconferencing technology," appears to offer a partial solution to social, cultural, economic, productivity, and other organizational problems associated with fulfilling/addressing organizational training requirements.

Teleconferencing can be defined as an altered communication environment where employees/personnel are trained at a centralized site with communication taking place via electronically transferred data, images, and other graphically represented material using teleconferencing technology. Teleconferencing technology has several successes as well as failures associated with its use in government and private organizations.

This study investigates the perceptions of government and private sector telecommunications professionals concerning teleconferencing's applicability to teletraining in general. The quality of teletraining was compared to the quality of traditional face-to-face training environments. Mail, facsimile, and telephone interviews of

knowledgeable telecommunications professionals who are considered to have expert knowledge as well as a thorough literature search were conducted.

Interview and literature search results concluded that teletraining via video teleconferencing is a viable alternative to traditional classroom training as long as the audience and instructor are familiar with the pros and cons of the technology.

Recommend implementing a pilot study for testing a teletraining program at AFLC/HQ. Also recommend development of a survey to collect additional data from personnel who use teletraining or the video teleconferencing network.

THE POTENTIAL BENEFITS OF USING VIDEO TELECONFERENCING  
AT AFLC/HQ TO CONDUCT TRAINING

I. Introduction

General Issue

The Air Force Logistics Command (AFLC) has a video teleconferencing network (VTCN) that is part of the Defense Commercial Telecommunications Network (DCTN), and it has realized millions of dollars in TDY cost savings, according to AFLC/Information Management (IMRV) records (31). The VTCN studios provide an environment which is comparable to the traditional classroom environment. In times of tight DOD budgets, efforts to conserve funds may increase organizational efficiency while reducing expenses. General Hansen, past AFLC Commander, implemented procedures to increase emphasis on people, user support, and quality. This research focuses on the potential benefits of using existing telecommunications facilities for conducting training in AFLC. Currently, AFLC spends millions of dollars annually for TDY travel to training schools. Instead of spending these funds on TDY to a training school, AFLC sees potential in using the VTCN for training in order to save some of the funds now spent for attendance at training courses. According to Mr. Frank Orehowsky, AFLC/IMRV, no one has investigated the feasibility of using the AFLC VTCN for training (31). The VTCN is used primarily for conducting meetings. This research addresses the potential for using AFLC's VTCN for conducting training.

## Background

The interest in the potential of the VTCN for conducting training is based on the increasing use of this medium by the Army, Navy, and others in the private sector. The literature review addresses how VTC technology is being used for conducting training in these other organizations. The AFLC VTCN has experienced cost avoidance savings over the past 19 months that also spurred the interest in other uses of the system. A breakdown of cost avoidance by Air Logistic Center is provided. The data in Table 1 was provided by AFLC/IMRV.

The AFLC network is located throughout the country and a map displaying exactly where the various sites are located is presented in Figure 1, provided by AFLC/IMRV. Theoretically, training could be originated at any of these locations and transmitted to any of the other sites via point-to-point or point-to-multipoint VTC technology. The AFLC network is not presently used for training. The type of training that AFLC could provide via the network would have to be identified by training specialists. Training could be tested during the weekends or some other time during which the network is not being used. The weekend testing would require additional manpower to set up and facilitate the use of the studios and equipment. The results of those tests could support whether or not the network could be used for training. This research identifies, in Chapter 2, some of the training courses that are delivered via teleconferencing technology used by other DOD agencies and private sector organizations.

Finally, it is important to remind the reader that the AFLC VTCN is being investigated for conducting training and not education. There is a clear difference between training and education. The term

"distance education" in the literature sometimes clouds the issue, but the researcher uses "distance education" in this thesis to refer to the conduct of training, and not education. Since training via the teleconferencing medium is a relatively new product of telecommunications, the issue of whether the use of teleconferencing in conducting training achieves organizational goals is the focus of this thesis.

Table 1. Cost Avoidance Breakdown By Air Logistic Center (ALC) (31)

VTCN COST ANALYSIS REPORT  
JAN 1989

LOCATION	# VTC	TRAVEL	PER DIEM	INTANGIBLE BENEFITS	GROSS TOTALS
TINKER AFB	53	\$ 25,506	\$ 15,236	\$ 6,985	\$ 47,727
ROBINS AFB	51	\$ 20,162	\$ 11,114	\$ 7,397	\$ 38,673
WPAFB	60	\$ 59,122	\$ 37,484	\$ 9,499	\$ 106,105
HILL AFB	49	\$ 21,458	\$ 15,787	\$ 4,415	\$ 41,660
KELLY AFB	54	\$ 55,622	\$ 26,325	\$ 13,884	\$ 99,821
McCLELLAN AFB	49	\$ 83,892	\$ 10,171	\$ 9,470	\$ 103,553
GROSS TOTALS	316	\$ 265,762	\$ 116,117	\$ 51,650	\$ 433,529
VTCN SYSTEMS OPERATIONS COST :				(-)	\$ 177,682
JAN NET COST AVOIDED:					\$ 255,847
19 MONTHS TOTAL SAVINGS				=	\$ 6,785,990

# DEFENSE COMMERCIAL TELECOMMUNICATIONS (DCTN) NETWORK

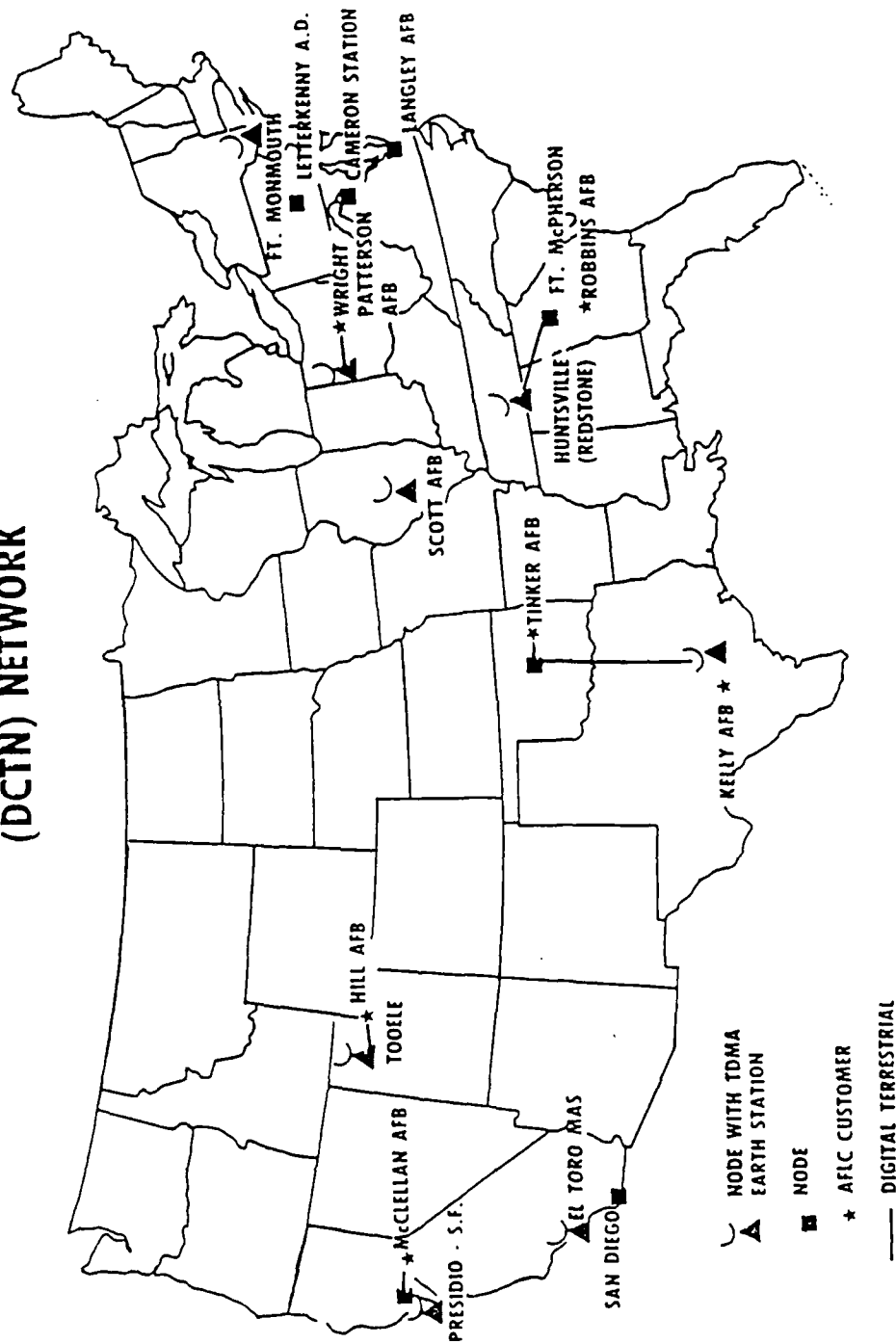


Figure 1. Map of Defense Commercial Telecommunications Network (DCTN) AFIC Site Locations (31)



### Problem Statement

in support of AFLC's management goals, AFLC/IMRV wishes to learn "Is it feasible to use the AFLC VTCN for training rather than have students go TDY to school?" (31)

### Investigative Questions

1. What are the potential benefits of using the AFLC VTC network for training?
2. How does the quality of training presented via the VTC network compare with the quality of training received at a TDY school (location)?

### Definition of Terms

Audio Conferencing. Voice only communication, using various equipment options for voice amplification and transmission, so as to allow multipoint communication among individuals and groups. A conference telephone call is the simplest form of audio teleconferencing (20:xvii).

Computer Conferencing. A text-based group communication medium, in which all exchanges are accomplished through a computer with a typewriter-like keyboard (20:xvii).

Cost avoidance. Method of using an alternate method to provide a service that would otherwise be more expensive than the service being provided.

Distance education. Defined in this thesis as method of providing training via telecommunications facilities.

Facilitator. Individual in charge of studio and acts as coordinator for teleconferencing session.

Intangible benefits. Key people receiving training and/or critical information by attending VTC briefings/workshops due to lack of

TDY funds. Briefings that attendees receive should be considered as positive cost avoidance. It helps to increase productivity as a result of quicker response time, and better use of time; and expands access to key people (31).

Interactive mode. Capability to communicate via voice and video means for conducting a meeting, training, or education.

Point-to-Multipoint Videoconference. An asymmetric conference in which all sites receive TV images but only one site can send them. The audio component may be bidirectional or unidirectional (41:79).

Point-to-Point Videoconference. Videoconference between two sites, each of which can transmit and receive audio and video (41:79).

Quality training. Measured by accomplishing a task at a required or higher level of proficiency.

Studio. Facility especially equipped to conduct teleconferencing. Point of origin or reception of telecommunications signals.

Teleconference. The use of a telecommunications system for communicating with people located at two or more locations (41:79).

Teletraining. Method of conducting training from a remote location.

Video teleconference. One in which near full-motion video is transmitted, as well as voice and visual aids (i.e. graphics, video tape, and 35mm slides). The video signal can be one-way (from one to many points) or two-way (simultaneously connecting two or more sites) (41:79).

Video teleconferencing network. Set of studios that are connected via teleconferencing technology.

#### Limitations of Study

This study did not attempt to answer the technological questions associated with using the AFLC VTCN for training. There will be some practical considerations that will have to be addressed later when specific training courses are identified.

#### Assumptions

For this study, travel involves crossing into another time zone or at least having to travel 500 miles. Again, the impact of having VTC facilities in each time zone is mentioned because the facilities limit the amount of travel that would be needed. The Army has found that:

A significant video application that we have seen in action is a quicker way to solve problems over long distances since more people can be available to accessible hardware, systems, and facilities, and it is possible to preclude costly and stress-related travel by a large number of specialists. (25:70)

The Navy thesis on teleconferencing supplies results from a study done to assess the students' perspective about teletraining. It is assumed that this study (the Smeltzer study) is still a valid representation of the students' point of view about teletraining (34:54). The results of the research from the Smeltzer study are located in Appendix E.

The distinction between education and training is based on for-credit work versus not-for-credit course work. Training to do a specific job or task, whether certification is granted or not, is the focus of this research.

### Summary

This section has provided the reader with a general problem statement, research questions, definitions, limitations of research, general issue, background information, and some assumptions. The following chapters will provide an extensive literature review, methodology, findings, and conclusions and recommendations.

## II. Literature Review

### Introduction

This literature review analyzes the most comprehensive secondary sources of information to provide a knowledge base for answering the investigative questions. Furthermore, the reader will become familiar with who is using teleconferencing technology for training purposes and what is being reported about its use in this area. From the literature, one thing is clear: use of teleconferencing technology to conduct training is growing rapidly in both the government and private sectors.

This review will be approached from three perspectives: first, government agencies' use of teleconferencing technology; second, private sector use of teleconferencing technology; and finally, some considerations that instructors and students should have in mind when teletraining is used to conduct training.

Government Agencies' Use of Teleconferencing Technology. Government use of telecommunications media for conducting training is increasing rapidly. Video teleconferencing is viewed as a cost effective method of providing training or conducting meetings over distance, according to both Dr. Sally Johnstone, Director, Instructional Telecommunications at the University of Maryland, and a Navy research report, "The Potential Benefits of Using Teleconference Technology in the Classroom Environment for U.S. Navy Training Courses." (21; 34:52)

DOD Video Teleconference Users Group. The DOD Video Teleconference Users Group was established under the authority and guidance of the DOD Video Teleconference Steering Group (12:1). The purposes of the group are as follows:

1. Act as a vehicle for information exchange within and without the DOD on issues dealing with video teleconferencing.
2. Make recommendations to and respond to inquiries or taskings from the DOD Video Teleconferencing Steering Group.
3. Support interoperability between DOD video teleconferencing users and between the DOD and users outside the DOD (including defense contractors). Support development and implementation of DOD, industry, and international VTC equipment standards.
4. Support enhancements to existing VTC systems, examine new technologies and applications.
5. Educate DOD users and prospective users about appropriate uses and impacts of VTC technologies and applications.
6. Identify, track, and address issues involving VTC.
7. Apprise, by way of the DOD VTC Steering Group, the video teleconferencing industry (vendors) of concerns and interests of the DOD user community when appropriate.
8. Promote VTC applications within the DOD. (12:1)

The charter of the DOD Video Teleconference Users Group covers a great deal of territory considering the span of use of video teleconferencing technology in the DOD.

Navy Research on Teleconferencing. The Navy has been very involved with the issue of teletraining and the role of studios providing similar environments to those of the traditional classroom environment. Their interest is based on a shortage of qualified instructors and the increasing demand for a highly trained organization (34:17). A recent thesis study conducted by a Naval Postgraduate School student provides some insight into the Navy position concerning teletraining via various teleconferencing systems. The Navy thesis suggests that using teleconferencing is a viable method for conducting training, especially when the number of qualified instructors is low and the demand for training is high (34:1-6).

The thesis goes further to categorize teleconferencing into three areas: audio, visual, and audio-visual. The tradeoffs, advantages, and disadvantages of the three styles of teleconferencing are discussed. The emphasis of this thesis is to discuss the use of videoconference centers that combine audio and visual to provide videoteleconferencing. A description of a videoteleconferencing system applicable to the Navy is provided and includes the following items:

1. A high quality yet inconspicuous audio system;
2. Full motion color video or;
3. Freeze frame or slow scan video system;
4. Controls to establish the transmission system;
5. High resolution graphics via a graphics or digital system;
6. Special features such as electronic blackboards, titlers, and electronic cursors. (34:12)

According to the Navy thesis, the advantages of videoteleconferencing are:

Possible substitute for face-to-face communications

Effective for task oriented, short, goal-oriented meetings (e.g., training courses).

The disadvantage is:

Cannot use most telephone lines (i.e., must rely on satellite relays)  
(34:12)

The next topic addresses current teleconference trends. The four teleconferencing systems that are mentioned in the Navy research are an audio teleconference system designed for use by brokerage firms; interactive video discs system used for training Air Force technicians at Keesler AFB; a full motion, interactive, encrypted, color video conference system used by the naval underwater systems command; and

private television networks serving 5000 locations primarily for business enterprises' training programs (34:13).

An area of major concern to every organization that trains its people is cost. The Center for Navy Analysis (CNA) conducted a study in 1987 about the factors that dominate Navy individual training costs. The study focused on specialized skill training as the main variable in the cost equation (34:15). The following factors were identified as being integral parts of the program:

1. Increase in training costs as a result of increased student load during the early part of this decade.
2. Navy unable to reduce the need for formal training.
3. On-the-job experience did not make up for less formal training.
4. Low student/instructor ratio for C-schools. (34:15)

C-school is more advanced than initial training that follows boot camp with a large amount of hands-on training. C-school concentrates on theories and advanced hands-on applications.

The CNA study does not address any recommendations to fight training costs increases. One method to offset the rising training costs mentioned in the CNA study is to centralize training sites (34:17). The three possible ways of centralizing real-time training are:

1. Reduce the number of locations of training sites and send all students to those locations (a minimum of one site).
2. Provide mobile training teams, based in one location, to travel to selected sites for training.
3. Videoconference the course to all students in various locations. (34:21)



Until recently, videoconferencing technology was not considered a viable alternative to more traditional forms of training. With the increase in the number of videoconferencing facilities and the quality of the systems, videoconferencing is being more widely used everyday. In many ways, videoconferencing is being substituted for the necessary travel requirements associated with traveling to a training facility (34:29).

Two quantitative studies, discussed in the Navy research, in videoconferencing were conducted to analyze the participants' feedback from using the technology. The two studies were conducted by Smeltzer, and Satellite Business Systems (SBS). Smeltzer's goal was to determine if students perceived teletraining as a plus or a minus in terms of learning ability (34:32). SBS wanted to explore and understand corporate users' perceptions of benefits resulting from videoconferencing (34:35).

The Smeltzer study was based on five research questions that were concerned with three areas of the learning process, namely, student stimulation, reinforcement, and participation (34:32). The results of the study are shown in Appendix E. The overall findings are as follows:

1. Students seemed to have more cohesion than in a traditional classroom.
2. There was consensus that it was difficult to get the teacher's attention in the videoteleconference environment.
3. Overall videoconference system performance was good.
4. Students became more comfortable with the system the more they used it. (34:54)

In the SBS study, started late in 1981, and completed in 1982, the majority of those ten organizations cited the reason they used

videoconferencing was to improve communications among geographically separated personnel (34:35).

"The range of questions was general and open-ended, inviting those questioned to support their responses with specific examples" (34:35). The SBS study serves as a benchmark in the study of human productivity during videoconferencing.

The SBS study found that videoconferencing would increase productivity mainly because of the significant decrease in travel expenses and time savings. SBS stated the full effects of videoconferencing would not be realized or understood for several years until more people gained experience. (34:37)

Videoconferencing user comfort with the environment is also important, according to the Navy research (34:40). Proper lighting and equipment are essential to improve the atmosphere and help reduce the fear of using the system. State-of-the-art equipment has been designed but is not necessary all of the time (34:40).

The change from more traditional training modes to videoconferencing is marked by changes in several areas. According to Navy research, several of the things that should be considered when contemplating change are:

The impact of change.

1. Information technologies' influence on change.
  - a. Organization and power structure.
  - b. Change in information flow.
  - c. Employee attitude
2. The question of change.

Implementing change.

1. The future state.

2. The present state.
3. Transition state. (34:44-49)

Shannon concluded the thesis with the following:

1. Videoconferencing is a viable and cost effective substitute for travel;
2. Teletraining does not adversely affect the learning process;
3. Navy instructors' indoctrination to teletraining is equally crucial to the success of teletraining as student indoctrination; and
4. The implementation of teletraining would be a radical change to the current method of teaching in the Navy. (34:52)

Navy Operational Teletraining Facility. The COMTRALANT VTC Report of 1988 addresses the feasibility of operating a video teleconferencing network, lists candidate courses, and discusses VTC staffing. Some of the video teleconferencing networks that were looked at were the Federal Emergency Management Agency (FEMA) and Emergency Education Network (EENET), Instructional Television Fixed System, and the Defense Commercial Telecommunications (DCTN) (35:17-20).

Twenty 'soft-skill' or information based courses were identified as video teleconferencing (VTC) candidates (35:21). The staffing plans for the Navy system are a key component of any system where leading edge technology is being applied to a traditional organizational function.

Video teleconferencing is a cost effective method of providing training or conducting meetings over distance. Instructors or meeting participants can interact with individuals at remote sites via live video and audio "interactive television." This live two-way audio, two-way video approach coupled with high resolution graphics provides many of the benefits of "in-person" meetings. (35:3)

It is estimated that 90,000 civilians in the southeastern personnel region could benefit from VTC training (35:5). "The findings of this

report indicate that VTC needs exist in both civilian and military Navy training support areas. Experience in usage is needed to best maximize a VTC system" (35:6).

Army Research on Use of Teletraining. The Army is also very busy in the area of teletraining. The Army facility, School of the Air (SOA) - Interactive Video Teletraining (IVT), Fort Eustis, Virginia, has been providing teletraining to its personnel and starting evaluations based on training effectiveness and cost effectiveness. The Interactive Video Teletraining (IVT) system provides one-way video transmitted by satellite from one or more originating facilities to any number of receiving sites (13:3). The Army evaluation consisted of analyzing five primary and concurrent actions to provide factual data to support training and cost effectiveness (13:10). One of the findings of that study will be presented and the other findings will be summarized.

SOA - IVT Finding. The SOA - IVT system was found to be cost effective as compared to live resident training. The system is manpower intensive and front-end development heavy. A mature IVT with established networking has the potential to increase cost effectiveness by the expansion of the student base, reduction of hardware rates, increased proficiencies by trainers and technicians, and additional usage in maximizing the technology to obtain Army training and readiness goals. (13:12)

Summary of Other SOA - IVT Findings. The SOA - IVT is an effective means of delivering training as compared to other current methods of instruction (13:12-13).

Other national and local government agencies use teletraining to capitalize on timely and highly interactive communication.

FBI Use of Teletraining. The Federal Bureau of Investigation (FBI) has pursued an aggressive plan of using video teleconferencing to address the law enforcement community's needs. The law enforcement

satellite training network (LESTN) is a cooperative venture of the FBI's Kansas City office and the Kansas City, MO, police department.

The marriage of teleconferencing and law enforcement training was first proposed by the FBI's Kansas City Training Coordinator and two police officers assigned to the department's training academy. When tasked with the assignment to develop and produce training videos, the two officers merged the traditional seminar training session format with an institutional cable channel in Kansas City. (24:2)

Law enforcement experts are made available to a wider audience, and the information presented can be timely, allowing for good service to law enforcement agencies (26:25). LESTN has used several private telecommunications facilities provided by Time Inc. and hospital television networks at very reasonable costs. It is currently estimated that almost 20,000 law enforcement personnel view a LESTN program and innumerable others watch a videotaped copy of it later (26:25). A pathologist from Yale University as well as Drug Enforcement Administration (DEA) narcotics experts have participated in training sessions on the LESTN.

Satellite teleconferencing has proven to be a cost-effective tool for providing valuable training information to a large law enforcement audience. (24:5)

The feedback from law enforcement viewers has been very positive and satellite teleconferencing's place in current communications has been established. (26:25)

Military Students' Attitudes Towards Instructional T.V.. Another form of telecommunications, videotape, was used in an experimental setting to try to elicit the attitudes of students about learning via instructional television. "Military Students' Attitudes Towards Classroom Use of Instructional Television at The United States Air Force Academy (USAFA)," is a doctoral dissertation conducted by Major John A.

Stibravy of the School of Systems and Logistics, Air Force Institute of Technology. The purpose of the study was to determine the attitudes of students at the USAFA towards the use of instructional television (ITV) in the classroom and to determine attitudinal differences in the student population which consisted of all cadets enrolled in English during the spring semester of 1983 (39:19).

The ITV dissertation focuses on the attitudes of faculty, students, and administrators concerning their resistance to using ITV in the classroom. The literature review discovered that TV in the classroom has repeatedly been proven to be as effective as a live teacher with respect to teaching facts to students (39:30). The distinction between whether ITV or teachers are suitable for the goals of the learning environment are delineated by the course material. According to Major Stibravy,

ITV was shown to be less effective at teaching courses requiring critical thinking or independent work, but overall there was no significant difference in terms of learning between having a TV instruct courses and having a teacher do the same job. In the upper level courses, where the teaching of values became important, TV may have been less effective than in lower courses. TV was especially effective in very large classes where the benefit was not increased learning but being able to reach a larger number of students with information. (39:30-31)

The findings of the research by Major Stibravy point out that most of the cadets were neutral as far as being favorable or unfavorable to using ITV in the classroom environment. One very significant finding addressed the mean attitude scores of cadets by class (39:125). The finding indicates that freshman are more favorable to using ITV than are seniors (39:125). No clear cut reasons are given for this phenomenon, though a few plausible reasons are mentioned. A summary of cadet

attitudes specified the importance of the student-teacher relationship. Cadets were mostly concerned with "immediate interaction with teacher (chance to ask questions) and being treated as human" when it comes to in class issues (39:147).

Some of the topics addressed by Major Stibravy in the conclusions and recommendations chapter are the focus of much of the literature about telecommunications (teleconferencing) concerns today. The following information taken from Major Stibravy's dissertation addresses many of the issues discussed in the literature. The words in parentheses capsule the issues regarding the use of telecommunications in training.

Cadets did not favor TV in the classroom because it restricted the cadets' ability to influence the course of events. (Responsive Interaction)

Findings for the effect of differing educational levels on attitude suggest that more consideration should be given to selecting the audience most receptive to ITV use when determining which audience will receive instruction via ITV. (Audience Selection)

It is recommended that one approach to changing cadet attitudes to favor ITV use is to change the attitudes of the cadet formal and informal leaders in the areas of academics, sports, and military leadership. Once the attitudes of the cadet leaders are changed, the effect should spread throughout the cadet wing. (Leadership)

The literature review suggested that the loss of student-teacher interaction was the primary reason for both teacher and student dislike of ITV. (Interaction)

Since the cadets defined the most important part of the student-teacher relationship as immediate interaction with the teacher, the recommendation is therefore made that the academy should hire teachers based upon their ability to perform in the classroom and to interact with the cadets, rather than based upon their own academic achievements. (39:157-161) (Trained Instructors)

Other recommendations based on discussions related to the study conducted by Major Stibravy, but not directly a result of the research

questions, provided some insight into using telecommunications in an educational environment. It was learned that military teachers had attitudes regarding ITV use, but had no knowledge about TV literature or data to support their opinions (39:163). "Military teachers who had not had any education courses had little idea of exactly why they used any given methodology in the classroom environment" (39:163). The following suggestion could be applicable to any instructor using technology to enhance or lead classroom sessions.

Consideration should be given to developing a short orientation course to be presented every summer to academy teachers, students, and television production personnel. Attitudes can not be changed in favor of technology if one of the main determinants of attitudes, the teachers, does not understand, from all points of view, why a given classroom methodology is selected. (39:164)

#### Teleconferencing at the United States Department of Agriculture.

The United States Department of Agriculture (USDA) uses teleconferencing technology. "Teleconferencing provides executives and staff with a means to do projects that might not otherwise be possible" (15:14). Executive and personnel training requirements at the USDA are being met with teleconferencing technology which allows them to save thousands of dollars while maintaining the needed level of training sessions.

In addition to its regular field staff training sessions, the USDA has conducted three programs entitled, "The President's Council of Management Improvement," to help executives focus on productivity and management issues. To test the effectiveness of its teleconferencing training programs, the Department has even conducted a pre- and post-training test which has proven that substantive learning has taken place during conference call meetings. (15:14)

Aeronautical Systems Division Teleconferencing Center. In the article, "ASD Unveils Teleconference Center," the features and some of



the capabilities of the Aeronautical Systems Divisions' (ASD) new video teleconferencing center are outlined. According to Mr. Robert Bumbulucz, Director of Visual Information at ASD's Deputy for Resource Management, "It will allow people at ASD to interact visually and verbally with other federal workers and contractors at many additional locations, without the cost and time involved in temporary duty travel (TDY) (1:5). The new center offers access to a multitude of electronic capabilities and is available for use by Department of Defense personnel who wish to reserve the facility. The Wright-Patterson AFB community is serviced by several teleconferencing centers and the list of knowledgeable personnel with backgrounds in telecommunications is growing. Some barriers to using teleconferencing technology still exist and need to be addressed. Some of the barriers will be addressed in this study in the teletraining considerations for instructors and trainees section. ASD personnel are still expected to be hesitant at first to use the center (1:5). The center's personnel provide training as well as a basic guidebook to help users have more effective meetings via the center (1:5).

#### Summary of Government Users

Some of the recent work in the area of training using telecommunications has been taking place through the government. The use of teletraining and some research in the following agencies were examined: Naval thesis, Army research reports, the Federal Bureau of Investigation, Navy Fleet Combat Training Center, and the United States Department of Agriculture (USDA). A doctoral dissertation on United States Military Students' Attitudes Toward Classroom Use Of Instructional Television (ITV) was reviewed as well as some recent

developments at the Aeronautical Systems Division (ASD) and their development of a teleconferencing center. The information presented in this section should give a good picture of how and why several government agencies are using teleconferencing and how various forms of teleconferencing apply to different needs.

#### Information Systems Consideration

According to the book, Information Systems Management In Practice, the charge for information systems specialists concerning organizational information needs is "To improve the performance of people in organizations through the use of information technology" (28:13). In private enterprise, it has been noted several times that support from upper-level management is necessary to develop information systems that support and are aligned with the strategic organizational goals. "The changes required to develop the necessary organizational structure will not happen without a significant amount of leadership at the executive level" (28:20). In most private organizations, "A Chief Information Officer (CIO) must be high enough in the organization to relate to and adopt organizational goals and to assume the responsibility of harnessing the technology to pursue those goals" (28:20).

In the Air Force, because of size and organizational structure, CIOs, or their equivalents, should be emerging at least at the major command level. One fundamental difference between the government and the private sector is that,

Most information systems executives have also long assumed an important role in training and education, to increase the organization's ability to assimilate information technology, (28:37)

where not as much large scale assimilation of the use of video teleconferencing technology exists in the Air Force, as evidenced by the numerous people who are scampering around to get information about video teleconferencing for their organizations.

A good question to ask when strategic use of a system is the focal point is "How can we use information technology to help our customers more easily acquire our product and then get more value out of it" (28:65)? According to Information Systems Management In Practice, technology may change the way companies work by:

1. Changing how decisions are made.
2. Offering more communication options.
3. Providing tools for coordination (28:79).

To meet the needs of organizational decision-making, Huber says three technologies will be needed:

1. Advanced computer and communication technologies.
2. Decision group technologies.
3. Technology support for managing decision processes (28:79).

Finally, the composition of groups gathering for meetings, education, or training will be impacted by technology in the near future as never before. One view pertaining to technologies' impact on group gatherings in the future is that,

The number of persons contributing to a decision from outside this formal unit will be larger than is typically the case today. These contributors will participate more on an ad hoc, informal basis, and will be asked for their input via advanced computer and communications technologies, such as computer message systems, computer conferencing, or video conferencing. (28:80)

### Private Sector Use of Teleconferencing Technology

In the private sector, the use of teletraining is having an impact on the way some large corporations are approaching the training of their personnel. The following sections look at teletraining successes and failures, impact on competitive advantage, logistics-related teleconferencing, interactive teaching considerations, university (NUTN/NTU) use of teleconferencing technology, programs offered via teletraining media, McDonald's use of videotape, and teletraining as an alternative.

#### Successes and Failures of Teleconferencing Technology.

This section provides a further discussion on success and failure associated with the use of various teleconferencing media used by large organizations. Teleconferencing has been used successfully to support sales representatives, trade shows marketing, sales training, and for splashy extravaganza events (19:159). The following outlines some organizations that have used teleconferencing technology to enhance their ability to communicate with their personnel in a way that fits the dynamics of their operating environment. How the organizations used the technology will also be included.

Hewlett-Packard: A point-to-multipoint video teleconferencing network has been created for new product introductions and similar activities, greatly increasing the resources available to sales representatives.

IBM: To provide ongoing courses to their training sites for sales staff (as well as others), IBM created their (ISEN) network. The system includes point-to-multi-point video, audio controlled by the instructor, and a polling mechanism for use with question-and-answer sessions.

A.T. & T.: The Cincinnati - based A.T. & T. national teletraining center runs daily lunch time

training sessions via audio for sales staff as well as more structured sessions in specific contact areas. Over 200 locations are involved with a broad mix of teleconferencing media. Tens of thousands of people each year now attend these sessions, with very strong positive results.

Digital Equip. Corp.: To train its 8,000 sales support personnel throughout North America with important, time-sensitive business announcements, digital used its own network plus hotel sites in the United States and Canada. To reach Digital's sales people out in the field would have required up to two months using conventional media, the company estimates.

Conference speakers can appear via teleconference. In this way, the conference organizer may be able to obtain a prominent speaker who would otherwise be unable to travel to the meeting. (19:159)

There are organizations that have tried various forms of teleconferencing technology with poor results and developed bad tastes for the technology. According to the results of an interview of 22 fortune company employees, the interviewees said that, "audio was okay, they thought, for occasional use. Video looked like a lot of fun, but it was perceived as costing too much money" (19:162). The 22 organizations that participated in the study represented a broad spectrum of organizations (19:162). According to Mr. Johansen,

Although the backgrounds of the interviewees were diverse, they had many features in common. Nearly all of them worked in telecommunications departments of major organizations. Therefore, they were not primarily involved in planning corporate strategy, nor were they the end users in the company (19:162).

The cost associated with teleconferencing technology, as well as the feeling that teleconferencing equates with only full-motion video, were the main stumbling blocks that many of the respondents gave when asked about the lack of a major teleconferencing system in their organization (19:163).

Other factors were identified as contributing to the lack of use of teleconferencing technology by some organizations. Though most concern is centered around cost and cost-benefit analysis which is difficult to elicit, the following factors were obtained from a user of several media, including audiographic and facsimile technology (19:164). The reasons given for lack of success are:

1. Poor promotion of the system within the organization.
2. Improper control.
3. Lack of user awareness.
4. A dearth of education and training. (19:164)

Top management must support and direct new ventures in an organization. When an organization's social, cultural, and technical bases can be impacted with the potential applications provided by teleconferencing technology, the lead for change in the organization's infrastructure must come from those key personnel who direct the strategic movements of the organization (11:422-423). According to Mr. Johansen, "without strong and vocal support of at least one relatively senior manager, teleconferencing does not have a chance of succeeding" (19:165).

The 22 nonusers of teleconferencing technology interviewed were asked about what would have to take place before they would reconsider using teleconferencing (19:167). In general, the respondents identified four factors as follows:

1. Prices would have to come down for business in general to adopt some form of teleconferencing.
2. All forms of teleconferencing must be easy to use - user friendly, as the cliché says.

3. Teleconferencing would need to be applications oriented.

4. The world at large needs more success stories. (19:167)

On a more specific basis, the interviewees were asked about what was needed in their own organizations. "In addition to the four problem areas mentioned above in this paragraph, management needed to endorse teleconferencing before it could be accepted, and many managers were leery of the technology or fearful that it would deprive them of perks (primarily travel) (19:167).

While this thesis does not attempt to oversimplify the issue of teleconferencing's applicability to various organizational settings/problems, the mention of the problems that exist between users and vendors must be mentioned briefly. "The predominant feeling expressed among vendors is that the concept of teleconferencing is not well understood" (19:169). Users feel that the vendors are not responsive to their specific needs and that teleconferencing is a viable system that can be used to their business advantage, but that vendors need to do a better job of marketing their products, and a take-it-or-leave-it attitude is not an asset for the teleconferencing representative (19:167). The following list gives the most frequently mentioned attitudes by the vendors who were quoting the views of potential clients who had turned them down:

1. "Our company, and many others, are not culturally prepared to take on teleconferencing in a big way."
2. "We believe it is still too new and doesn't come naturally or spontaneously for most people."
3. "We feel it is a behavior change that is likely to take quite a while to get used to."
4. "We are scared to take the risk, afraid of failure." (19:171)

Table II shows the results of case studies of specific situations in which teleconferencing has failed. Table II lists 21 failure factors that have been identified from years of analyzing both successes and failures (19:178).

Table II. Failure Factors In Teleconferencing (19:177).

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1. Did not perform accurate needs assessment.
2. System not promoted internally.
3. Technology unsuited to organizational culture.
4. Performed poor cost-benefit analysis.
5. Wrong timing.
6. Overemphasized travel substitution.
7. No department willing to champion the cause.
8. Technology did not match perceived application.
9. No feeling of "ownership" of the system.
10. No top-down endorsement.
11. Too much comparison to face-to-face meetings.
12. System not easily accessible to potential users.
13. Concept not well understood.
14. System was too project specific - a limited pool of users.
15. Poor facilitation - no commitment to the system, little training.
16. Technology not easy to use.
17. Little or no emphasis on training users.
18. Senior management not involved until too late.
19. System resisted for political reasons.
20. Overseas management not made sufficiently involved.
21. Wrong first user group.



Impact of Telecommunications on Business Competition. According to Peter G.W. Keen, telecommunications is having an impact on the way large organizations conduct business and will continue to do so into the 1990s. A competitive advantage can be realized by using telecommunications in various aspects of a business. In the past, those businesses that took the lead were considered the risk takers and other businesses would wait until the risk takers measured the results of their risky endeavors. Only after the risk takers reviewed the results and proved the viability of using an idea or system did the more conservative businesses consider using the risky system.

Several large organizations have attempted to move into a new era through telecommunications technology. It seems as though for every success story there looms a story of failure to take away from the gains made by the successes. Dun and Bradstreet was successful in repositioning itself to become an electronic publisher, while The New York Times tried to do the same thing earlier and was unsuccessful (23:13). Sears is another leader in the use of telecommunications technology and they have some minor successes and failures. Also, several large organizations have combined efforts to minimize individual risks of using telecommunications technology. The following outlines some of the organizations and the amounts of money involved in technological exploration.

The cautionary tales could be multiplied: Citibank and McGraw-Hill's joint venture, GEM; the consortium of CBS, Sears, and IBM losing over \$30 million each in a videotex venture; and on the vendor side, U.S. Sprint's loss in 1987 of \$1 billion trying to buy market share via advanced telecommunications technology. (23:14)

When senior business managers become aware that telecommunications is now important to business effectiveness and not just to operational efficiency, they still have little idea of what to do" (23:20). An environment conducive to dealing with the technical aspects of telecommunications technology and to dealing with the attitudinal considerations of personnel will have to be nurtured within the organizational infrastructure.

Creating an organizational strategy for telecommunications requires a new style of business thinking among senior managers, who must also have some insight into key aspects of the technology itself. The question is where to start. (23:20)

Logistics Possibilities of Teleconferencing. "Gaining Logistics Advice Through Electronic Conferencing" explores the realm of using personal computers (PCs), modems, telephone lines, and a "souped-up" electronic mail system in which practitioners can network to get answers to business related problems.

Electronic conferencing (EC) is used for problem solving, announcing new service releases, and to generally assist users in sharing experiences and information. This exchange of information would be analogous to how practitioners currently share experiences at professional seminars and workshops. (27:176)

The interactive nature of face-to-face sessions allows participants to ask questions and receive immediate feedback. It is usually not possible to send all or a majority of personnel from an organization to a conference or seminar because of time and budgetary constraints.

With EC, questions could be posed directly to experts or broadcasted to peers in industry. Other options might include scheduled, on-line discussions of focused subject material. Several faculty members at the University of Wisconsin Management Institute felt that many practitioners would like to take advantage of the information gained at conferences and seminars.

Practitioners were, however, constrained by the lack of time or budget to attend. (27:176)

The importance of conferences and seminars and the values associated with attending them are as follows:

1. An opportunity to become aware of new information or technology.
2. The ability to meet and exchange ideas with industry professionals including a chance to meet and talk to experts.
3. An opportunity to become aware of industry trends.
4. Respondents expressed the fact that they often wished others from their company could have been in attendance at a conference. (27:180)

Figure 2 illustrates respondents' opinions about electronic conferencing. The features of high interest are listed after Figure 2.

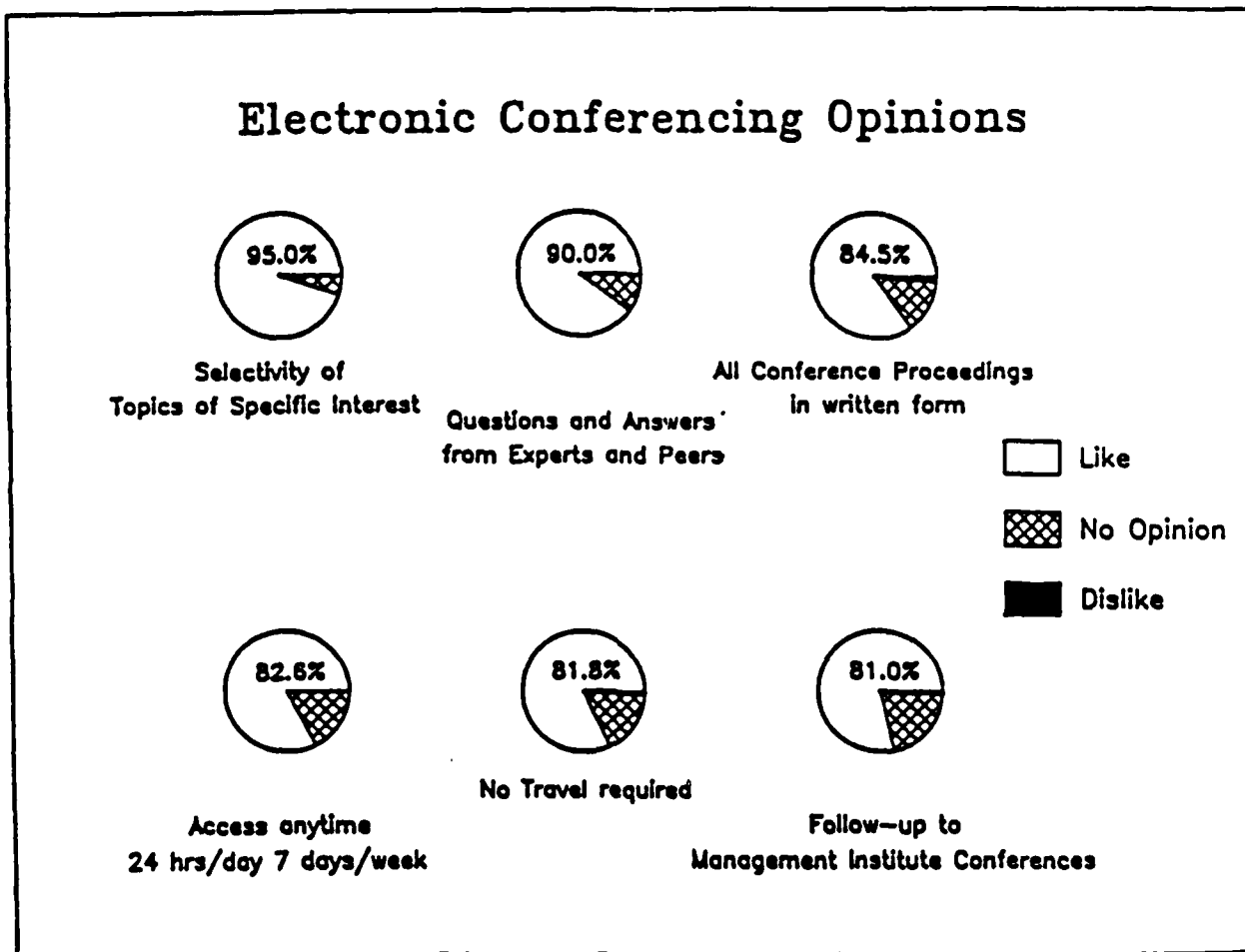


Figure 2. Electronic Conferencing Opinions (27:187).

The features of high interest are:

1. The focused selectivity of topics.
2. Being able to direct questions and get answers from experts and peers.
3. Proceedings from past EC dialogues available in written form.
4. Anytime access.
5. No travel.
6. Follow-up to management institute conferences and workshops. (27:180)

NUTN/NTU Teletraining. Large organizations and universities are using teleconferencing technology for training and education requirements with greater acceptance by personnel receiving the service. Many systems are providing a means for personnel to receive a service while reducing many of the interruptions associated with travel and starting a program, and then relocating because of company personnel transfers.

According to J. O. Grantham, Chairman of the National University

Teleconference Network (NUTN):

Companies are tending toward building their own private business television networks, and keeping their employees on premises for training. More and more company employees are staying on-site at companies in order to get their training. The companies simply can't afford for employees to lose large amounts of time by training offsite. (4:41)

NUTN delivers what business people want, and the programming is not boring material (4:41). "The university programs are often put together by professors whose universities are on the leading edge of research in their fields" (4:41).

The National Technological University (NTU) exists solely through its electronic network and is responsive to the needs of its student viewers (4:41). NTU exists to serve the training needs of corporations

and relies on constant feedback and input from users, says Mr. Mark Bradley, Marketing Manager for NTU.

Students like the NTU design. They don't have to leave their office to attend class, they don't have to worry about being transferred by the company and losing time in their course work (the programming follows them), and they like receiving the most up to date information possible. (4:41)

"Low Tech High Tech," by David W. Shively is an article that describes how engineers and scientists at Honeywell and Digital Equipment Corporation used business television, teleconferencing technology, to conduct a short course in operational amplifier circuits. The key idea conveyed in the article is,

Good business television is a matter of knowing your audience and meeting their expectations. Presentation styles and production approaches are important only to the extent that they help meet those expectations. (37:43)

Several of the key issues mentioned in much of the literature are addressed by Shively. The overall production and the motivation of the participants are seen as key issues.

The presentation was a straight lecture, delivered in front of a series of pre-drawn chalk boards. The style was informal, slightly rumpled, and contained the little touches of theater which separate the really good faculty from the merely so-so.

The answer lies in the nature of continuing education, particularly that of engineers. These people are highly motivated. Their time is limited, and their ability to stay current or advance their careers depends on their mastery of increasingly complex topics. (37:43)

The National Technological University (NTU) provided the technical capabilities to conduct the short course and Dr. Aram Budak, a nationally recognized professor of electrical engineering at Colorado State University, conducted the two day (six hours per day!) NTU seminar (37:43). The comments from the participants were, "excellent professor," and "very thorough presentation" (37:43).

Courses Offered on Teleconferencing Networks. The "Alphabetical Program Listing" provides a comprehensive list of the programs that will be available via video teleconferencing technology. The organizations that have networks that provide programming cover a broad spectrum of disciplines. Organizations and some of the programs that they have offered are as follows:

1. Institutional Research Network (IRN)
  - a. Leadership: Management with a Vision
  - b. The Service Economy
  - c. Visioning: Setting Management Strategy
2. Hospital Satellite Network (HSN)
  - a. Communication: How to Manage Conflict
  - b. Understanding Breast Cancer
  - c. Nurseweek
3. National Technological University (NTU)
  - a. Production Control
  - b. Data Communications
  - c. Operations Research (1:19-21, 24-32)

McDonald's Use of Videotape Since 1971. "McDonald's Tasty Tapes," by Susan Bisno, briefly describes McDonald's use of videotapes in providing initial and reinforcement training for their employees. "McDonald's uses videotapes to teach employees to do everything from prepare foods to clean equipment" (3:37). The videotapes are stored at the various McDonald's locations and used whenever employees or management deem it necessary to use them. Every McDonald's has a videotape library of 40 tapes and the corporation believes it's the most efficient way to train employees at franchises from coast to coast (3:37). "McDonald's has been using videotapes for education since 1971 and is constantly updating the tapes as new procedures are developed" (3:37). According to Bisno, "Live teaching presentations at the franchises are rare" (3:37).

Training at Motorola, Ford, DEC, J.C. Penney, and AMI. Motorola Corporation has developed quite an extensive training program at their training and education center in Schaumburg, Illinois. The Motorola Training and Education Center (MTEC) has provided much more than seminars and live classes since 1981. According to the article "Beam Me Up, Scotty," Motorola planned to use technology whenever possible to make their training more efficient, more effective, and more widely available worldwide (33:46). Since 1981, Motorola has enhanced its training and education facility by installing a satellite communications system to deliver live, interactive training programs (33:47).

Others using teleconferencing technology to conduct training include Ford, Digital Equipment Corporation, J.C. Penney, and American Medical International (AMI) (38:57). According to the article, "Video Teleconferencing-A New Training Tool,"

At present, the most ubiquitous form of teleconferencing used in corporate training is one-way video and two-way audio, whereby the instructor is seen by the students and they may ask questions via an interactive audio link. (38:57)

Some others are presently using the least expensive teleconferencing system, slow scan video, to provide two-way audio and video (38:58). Considerations for the speed of motion should be reviewed before deciding on the type of teleconferencing system to use. If an organization has an existing system that is available, some effort might be given in the area of developing programming that can benefit from the specifics of the system.

#### Teletraining Considerations For Instructors and Students

This section will address some of the aspects of teletraining that



instructors and students should consider when entering a teletraining environment.

Teletraining Teaching Considerations. Dr. Sally Johnstone in the article, "Interactive Teaching: Breaking Television Viewing Habits," highlights several considerations that teleconferencing professionals should remember when trying to get the most out of a teleconferencing session. According to Dr. Johnstone,

The growing use of video teleconferencing as an educational and training tool requires an examination of the new skills that are needed by both the instructor and the learner to enable them to fully utilize the interactive capability of this technological environment (22:4).

Two factors that impact viewer behavior are viewers usually combine several different activities with television viewing, and problems are associated with asking the instructor questions (22:4). A method for instructors to use to deal with the viewer problems is to talk directly to the distant learner and require a response at the very beginning of the session (22:4). Furthermore, a suggestion for handling the problem of asking questions was provided to Dr. Johnstone by Mr. Ray PirkI, Director of the Instructional Support Services at Portland Community College.

To set a convention for questions asked from remote sites for example, the instructor may request the learner to substitute the verbal phrase "question" for a raised hand.... When the instructor is ready for the question, the learner can identify him/ or herself and the location of the remote classroom if there is more than one participating in this class session.... This makes interaction for the instructor and the learner easier, and thereby more likely. (22:5)

According to Dr. Johnstone, "One must carefully examine the differences between the traditional face-to-face learning environment and the normal

television viewing environment, then create the unique hybrid of these two" (22:6).

Teletraining as an Alternative. In their article, "Teletraining: A High Tech Alternative," Boone and Schulman address the viability of using teleconferencing to conduct training, and they state that "training through teleconferencing is a productive, cost-effective way to supplement traditional training" (5:4). Furthermore, the basic functions that an instructor performs are outlined by Boone and Schulman. Teletrainers' functions that help gain control of the training environment are important aspects of teletraining to consider. Teletrainers must coordinate with the site facilitators to make the overall training experience run smoothly. "If properly trained, the facilitators are the instructor's hands and eyes and, if properly trained, they can be extremely helpful" (5:4). According to Boone and Schulman, "trainers are often apprehensive about using technology or uninformed about using it to meet their needs" (5:5). This point was also mentioned in the informal findings of the dissertation on military students' attitudes towards instructional television conducted by Stibravy. The following ideas were given to help trainers use site facilitators to enhance the training experience.

Brief room coordinators before you do a group exercise so that they can supplement your on-line (telephone) instructions and have all of the necessary materials at hand.

Make sure that coordinators receive the proper materials ahead of time. Check and recheck.

If possible, arrange a telephone meeting with room coordinators two days ahead of time (or call them individually) to be sure that they are familiar with handouts, slides, and procedures.

Have room coordinators read responses if the students are shy or if the group is too large. (5:4)

Boone and Schulman also recommend some other helpful tips that teletrainers should be particularly aware of. The helpful tips are listed next.

1. Create an electronic classroom through shared space
2. Use visuals properly
3. Establish credibility and authority
4. Encourage interaction
5. Ensure clear communication
6. Modulate your voice
7. Deal with conflict positively
8. Maintain a sense of humor
9. Keep up momentum
10. Pay attention to the emotional climate of the conference
11. Follow-up to the conference (5:5-7)

The authors conclude the article with,

If instructors know about teleconferencing and the proper ways to use it, they can easily overcome the constraints of the medium. Teletraining programs can save time and money, and they can provide training opportunities that would not exist without this medium. (5:8)

"Teaching Over Television," by C. Louis Nevins and Leslie J. Wright, California State University, Chico, is an informative guide that addresses many of the concerns that are raised about using technology to conduct education. Nevins and Wright point out the fact that not only is the instructor the center of activity, he or she is also the director of the program (30:4). To this end, using technology to reach a larger, more dispersed audience is merely an extension of regular classroom

teaching (30:4). A key concept that has been mentioned in much of the literature and expressed in different ways is that, "shortly after the semester begins you and the instructional television fixed service (ITFS) operator should become an effective team" (30:4). The effective team that is mentioned should also be considered when teletraining instructors have site facilitators or coordinators who can enhance the training experience at their respective sites.

Several other aspects of using technology to communicate with various sites are outlined by Nevins and Wright. The following considerations are provided as per Nevins and Wright.

1. Don't forget the student who sees you through the camera
2. The lesson is more important than the self on camera
3. Volume and pitch of voice
4. Flow of words, timing, pauses
5. Body movement
6. Audio-visual aids
7. Production techniques
8. Require interaction from your off-campus students
9. Proper coordination for class handouts at remote locations (30)

The "Teaching Over Television" handbook is a good model for other organizations to use which interested in using technology to supplement the traditional methods for providing education and training.

"Evaluating Video-Based Training Materials," by Robert F. Sullivan and Dennis C. Myers, is an article geared towards instructor who will use video-based training materials (40:82). There is great potential for using video-based materials in a teletraining environment. Sullivan

and Myers provide checklists for the instructor to use when previewing video-based material being considered for use in the training setting. The checklists address program description and program assessment once one has concluded that video is the right medium for delivering all or part of a training program (40:82). The following is a partial list of the eighteen items that comprise the program assessment portion of evaluating video-based training materials.

1. The program would gain and maintain trainee interests.
2. Trainees can identify easily with the characters and setting portrayed in the videotape.
3. Trainees are informed early in the program exactly what performance is expected.
4. Trainees have necessary prerequisite skills and knowledge to be able to benefit from the program.
5. The program shows the appropriate content and provides a variety of examples to help trainees acquire the expected capabilities.
6. Narration is used to explain what is not obvious in the visuals.
7. Language is appropriate; it contains minimal technical jargon and an appropriate vocabulary level.
8. Humor is used appropriately and helps achieve objectives.
9. The program contains up-to-date information and visual details (40:83-85).

The items listed by Sullivan and Myers are meant for instructors previewing videotaped material for presentation to trainees. Similar checklists or critiques of instructor presentation of material could be developed for trainees to give feedback about a teletraining program.

### Conclusion

The literature review reveals that teleconferencing technology is being used increasingly in both the public and private

sectors. There are both success and failure stories about the application of the technology within and between organizations. In general, telecommunications technology is more widely used in business as a tool for competition than ever before.

The participants in teletraining (instructors, students, and facilitators) need some familiarization with the organizational culture that is the driving force behind organizational change and the use of alternate training methods. The viewing habits and perceptions of the audiences that receive teletraining need to be better understood as being an intricate part of the teletraining environment. More organizational personnel stand to benefit from the use of teletraining since more individuals from a shop can participate in teletraining than in face-to-face training. A lot of homework needs to be done on better understanding the needs of various audiences. Teletraining probably should not be substituted entirely for traditional training even if technological advancement makes it possible.

A staff equipped with knowledge of organizational training requirements and trained facilitators must be supported by top management. The staff should maintain a system for constant, concise feedback from all participants using their facility as well as give input to an office that manages the entire multipoint system.

Publicity about the current trends in teleconferencing needs to be disseminated to all organizations. The potential impact of using teleconferencing in the military is not close to being realized. Most people who know a teleconferencing system/facility exists in their local area do not know much more about the technology other than it exists. Lessons learned, new applications, success and failure stories, and

other means of distributing information about the technology need to be more readily accessible. Clear from the literature are the facts that teleconferencing technology is making great strides and the costs of using the technology are falling.

The next chapter will cover the methodology that was applied to conduct the research for this study.

### III. Methodology

#### Methods

A thorough literature search and informal structured interviews with experts and researchers allowed this researcher to answer specific questions as derived from consultations with AFLC/IMRV management. Informal structured interviews suggested by AFLC/IMRV were conducted via the telephone, written correspondence, and in person. The researcher decided to conduct the interviews in accordance with the interviewees' wishes as identified by the interviewees. The interviewees definitely had preferences as to how the interview would be conducted. Time was the major factor for conducting the interviews. Also considered important was the method for recording the interview responses. Taking into consideration the time element and quality of response, facsimile and mail were used to acquire the interview responses. The same methods for answering the investigative questions were used for both of the investigative questions.

Library Method. Library research is viewed as one of the most comprehensive methods for conducting research, according to Busha and Harter (7) and Powell (32). The following is how the research was conducted:

1. Examined a study done by the Navy on its training environments and the use of VTC for Navy training; drew conclusions about Air Force training methods and applicability of Navy study to the Air Force (34).
2. Reviewed the use of teleconferencing technology by government organizations.



3. Focused a literature search on private sector and governmental use of VTC technology used for training and other applications of VTC technology.

Interview Method. Informal structured interviews were suggested by the sponsor as an adequate approach to tapping into the vast experience base of both private sector and governmental experts and others knowledgeable about the uses of teleconferencing technology and technological trends. According to Emory, interviews provide a viable method for conducting research (14:160). Telephone, mail, and facsimile technology were used to conduct interviews which enhanced the flow of information between the researcher and the experts. The telephone portion of the interview process mainly provided timely feedback to participants' questions concerning the interview questions. The majority of the respondents used facsimile to respond and commented that use of facsimile information transfer would allow them more time to think about their responses and organize their responses. For the purposes of this research, experts are considered knowledgeable enough by peers to conduct consulting and express their opinions about teleconferencing technology and how it can be used in training environments. A guide with standard questions was made available to the researcher to use as a prompter during interviews to ensure uniformity in the interview process. This guide is attached as Appendix A.

The following experts in the field knowledgeable about the use of VTC technology in training environments were interviewed.

1. Dr. Ronald G. Heroux, VTC Program Manager, Naval Underwater Systems Center, Newport RI.

2. Dr. Richard Snowden, Special Projects Director,  
Fleet Combat Training Center, Atlantic, Virginia  
Beach VA.
3. Dr. Jeff Charles, Senior Research Fellow,  
Institute for the Future, Menlo Park CA.
4. Dr. Vanessa George, Director of Telecommunications  
Development, San Diego State University, San Diego CA.
5. Dr. Nofflet Williams, Associate Dean for Distance  
Learning, University of Kentucky, Lexington KY.
6. Mr. John Brolockwell, Director of Satellite  
Education Programs, U S Army Logistics Management  
College, Fort Lee VA.
7. Ms. Margaret E. Gallico, VTC Administrator,  
National Cash Register (NCR) Corp., Dayton OH.
8. Dr. Michael Moore, Editor, The American Journal  
of Distance Education, Pennsylvania State University,  
University Park PA.

#### Conclusions About Use of Experts

Experts provide primary data about their field of expertise unlike any other source of information. The information from experts is also timely and can reflect current changes to the industry that have not yet been written about, but could prove to be valuable when assessing the performance of new technology. The opinions of experts from geographically dispersed locations also give a good perspective of how the industry is developing in different areas of the country facing different environmental and other factors that could impact the overall use of a given system. Much of the teleconferencing terminologies are standardized, but some consideration of further standardization of the terminology should be given because the researcher found several experts to have been talking about the same aspects of the industry, but with different terminology being used. The differences in the terminology being used could prove to be confusing to new users of the technology.

### Methodology Justification

Library research is viewed as one of the most comprehensive methods for conducting research, according to Busha and Harter (7) and Powell (32). According to Emory, interviews provide a viable method for conducting research (14:160). The various methods for interviewing experts were chosen because most of the interviewees are geographically dispersed. No unusual aspects of this methodology exist.

### Researcher Training

This researcher viewed several teleconferencing sessions. One session that included all Air Logistic Centers (ALCs) demonstrated the potential for using the AFLC system for conducting training. The session was a demonstration for Canon's Still Video System equipment. The Canon representative conducted the demonstration while approximately 25 people watched from the various ALCs. After the demonstration, several questions were asked, and some confusing parts of the demonstration were done again. The experience base of several of the people in the audience provided for a wide variety of questions about the new video technology. Several follow-up questions were also asked in reference to questions asked earlier in the session. The duration of the demonstration was approximately 45 minutes. The question and answer portion lasted about 45 minutes.

### Expected Benefits of the Research

This research will help AFLC/IMRV make decisions about the use of its video teleconferencing system based on its present use and other uses that could be made possible at reasonable expense. The research will also help management decide on whether to confirm or deny that increased use of technology can be and is beneficial to achieving the

management goals of maintaining a highly trained quality Air Force while facing budget constraints.

#### Summary

This chapter has provided some detailed information on the methods used to conduct the research study. This study combines methodologies because the subject area is relatively new and the sponsor mentioned an interest in seeing the research conducted as outlined in this chapter.

The next chapter presents the findings for the study. The findings are based on the interviews and literature search.

## IV. Findings

### Introduction

The respondents' feedback to the interviews are located in Appendix C. Eight of 15 of the interview participants responded by the time this chapter was prepared. Six of the 8 respondents used facsimile technology to transmit their responses which was considered to be a great time saving method. Using facsimile transmission allowed for the respondents to take as much time as they felt necessary to complete the interview at their convenience. Two of the respondents returned their interview via the mail. This section will report on the findings for the two investigative questions and the general responses to each interview question.

The researcher answered participants' questions to clarify the focus of the thesis. The question area that was referred to most focused on specifying whether education or training was the main focus for the thesis. The distinction between education and training is that an education course usually has some semester/quarter hours of credit associated with it while training courses usually provide instruction for performing a specific task. No college credit is given for completing training courses.

Investigative Question 1. Investigative Question 1 dealt with, "What are the potential benefits of using the AFLC VTC network for training?"

FINDINGS: The potential benefits of using the AFLC VTC network for conducting training are listed in Table III.

Table III. Potential Benefits of Using AFLC's VTCN to Conduct Training

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1. Greater exposure by the students to a more diverse base of experts.
  2. More people from a particular office can be trained at one time considering costs, time, travel, and other office management considerations.
  3. Interaction/feedback from a larger experience base with more people able to participate than under traditional training circumstances.
  4. Less impact on training session because of weather, travel, or other physiological effects.
  5. People who might not be trained because of course backlogs can be trained.
  6. Site facilitators become more involved with training sessions and develop a good base of knowledge for local personnel to use.
  7. AFLC can more fully use the existing facilities to take full advantage of the technology and opportunities presented.
  8. AFLC can gain better insight as to how teletraining can impact training requirements.
- 

The potential benefits could be impacted upon negatively if up front developmental costs for video teleconferencing are high. Much of the developmental costs are not realized by AFLC because the facilities that comprise the network are leased from AT&T. Some of the considerations that would be of importance concerning system developmental costs are outlined by the Army School of the Air (SOA) when they state that,

The SOA - Interactive Video Training (IVT) system was found to be cost effective as compared to live resident training. The system is manpower intensive and front-end development heavy. A mature IVT with established networking has the potential to increase cost effectiveness by the expansion of the student base, reduction of hardware rates, increased proficiencies by trainers and technicians, and additional

usage in maximizing the technology to obtain Army training and readiness goals. (13:12)

Investigative Question 2. Investigative question 2 asked, "How does the quality of training presented via the VTC network compare with the quality of training received at a TDY school (location)?"

FINDINGS: According to the responses received from the interviews for Interview Question 8 and the literature review, there is not much difference between the quality of the training presented via teleconferencing technology the quality at a TDY school. The key aspect of any training session seems to be the proper use of visual materials. Some other areas of concern were also mentioned by the interview respondents. The content of the material being presented and the production efforts of the instructor were considered to be integral parts of the total training session that impact the quality of training received by the trainee. According to Dr. Jeff Charles, the quality of a training session should be measured by how the training is done, trainee learning and other outcomes, and unanticipated consequences (10).

The following data was extracted from the respondents' feedback to the interview questions listed in Appendix A and are reported by individual or grouped interview questions.

Interview Questions 1, 2, and 3. Question 1 asked, "How long have you participated in teletraining as a method for conducting formal or informal training?" Question 2 asked, "What types of training via video teleconferencing systems have you personally viewed and evaluated?" Question 3 asked, "What organizations are you familiar with that use teletraining to train their personnel?" This section reports on the "establishment of expertise" of the respondents. The respondents are

from universities, federal agencies, research institutes, and large corporations. These individuals are responsible for research, management, and operation of telecommunications facilities.

FINDINGS: Table IV list the respondents by name, title, organization, and years of experience.

Table IV. Establishment of Expertise.

---

<u>Name</u>	<u>Title</u>	<u>Organization</u>	<u>Years/ Experience</u>
1. Broelckwell	Director, Satellite Education Programs	U S Army Logistics Management College	6
2. Charles	Senior Research Fellow	Inst for the Future	10
3. Gallico	VTC Administrator	Nat'l Cash Register	3
4. Heroux	VTC Program Manager	Naval Underwater Systems Ctr	6
5. Snowden	Special Projects Director	Fleet Combat Training Ctr, Atlantic	1.5
6. Moore	Editor, <u>Amer</u> <u>Journal of Dist</u> <u>Education</u>	Penn State Univ	20
7. George	Director of Telecommunications Development	San Diego State Univ	7
8. Williams	Assoc Dean for Distance Learning	Kentucky Univ	15

---

Though some of the experience might seem shallow, it is key to remember that the concept of teletraining is relatively new and not widely accepted yet. Many of these individuals could be considered pioneers; while others do not have longevity, they do have vast experience.



Table V provides a listing of the types of training via video teleconferencing systems and organizations the respondents are familiar with that use teleconferencing technology in a teletraining environment.

Table V. Types of Training and Organizations.

<u>Respondent Name</u>	<u>Types of Training</u>	<u>Organizations</u>
1. Brolckwell	short courses	Army
2. Charles	personnel and mgmt training	Private sector
3. Gallico	personnel and mgmt training	NCR
4. George	education, law enforcement	Universities Law Enforcement Agencies
5. Heroux	meetings	Navy
6. Moore	higher education	Universities
7. Snowden	short courses, maintenance	Navy
8. Williams	short courses, workshops, credit courses	NASA Universities

Interview Question 4. Question 4 asked, "Is student progress measured in the same way for teletraining and face-to-face training versions of the same course?" Interview Question 4 dealt with the way that student progress is measured for teletraining courses compared with face-to-face training versions of the same course.

FINDINGS: The majority of respondents who had knowledge about the methods for measuring student performance felt that student progress was measured the same for teletraining sessions as face-to-face sessions.

Interview Question 5. Question 5 asked, "In your opinion, does video teletraining enhance or reduce the student retention span?" Interview Question 5 dealt with whether video teletraining enhances or reduces the student retention span.

FINDINGS: The respondents were divided on this question. The respondents who felt the students' retention span was impacted made specific comments. The respondents' comments are divided into positive, neutral, and negative responses in Table VI.

Table VI. Student Retention Span With Teletraining.

---

Positive Response (s)

1. "Usually, students are highly motivated and can be expected to perform at or above the level of traditional students." (42)
2. "With interaction, same results." (6)

Neutral Response (s)

1. "The medium is far less significant than other variables such as content and learner characteristics." (29)
2. "This is not conclusive. It depends on the media. In computer conferencing, for instance, it's impossible to tell. When video is not live it is also" impossible to tell whether the video teletraining enhances or reduces the student's retention span. (10)

Negative Response (s)

1. "I think that some of the 'Magnetism' of the presenter is lost via video teletraining. I feel, therefore, that it's more difficult to maintain the attention span during videotraining. Consequently, special consideration needs to be given to the method of presentation, and to the breaks--both having enough breaks and having them well timed." (16)
- 

Interview Questions 6. Question 6 asked, "What types of training are suited for video teleconferencing technology?" Interview Question 6 dealt with the types of training suited for video teleconferencing.

FINDINGS: The types of courses that are suited for teletraining facilities are listed in Table VII.

Table VII. Types of Courses Applicable to Teletraining.

- 
1. "Procedural, abstract, short courses." (6)
  2. "Management training, personnel training, employee skills training, computer based training, education courses for upgrading skills." (10)
  3. "Basically, any kind of training is suitable as long as the appropriate provisions are made at the receiving sites for interaction, facilitation, questions and answers, training equipment, etc." (16)
  4. "All types except where field experience is required or hands-on with the equipment, unless the equipment is available at all sites." (18)
  5. "Mostly soft skill courses; however, we are starting to do maintenance courses at present." (36)
  6. "Virtually any type of training is suited. If you teach a large audience in a lecture hall, you may teach, via teleconferencing, to a large audience comprised of several small audiences at various sites." (17)
  7. "The more educated, experienced, and sophisticated the trainee, the more suitable is teleconferencing." (29)
  8. "Courses that require extensive laboratory or clinical activities are the most difficult to deliver. A very large percentage of teletraining activities can be delivered by video or audio." (42)
- 

Interview Question 7. Question 7 asked, "How are instructors selected who will provide teletraining?"

FINDINGS: Instructors for teletraining sessions are chosen at random by departmental decision makers, or because they volunteer, teach the functional area, or have subject expertise. A facilitator is often at the remote site to aid the instructor in communicating with students.

Interview Question 8. Question 8 asked, "How do you evaluate the overall training environment of a video teleconference compared to the same training provided in a traditional classroom environment?"

Interview Question 8 dealt with evaluating the overall training environment of a video teleconference compared to the same training provided in a traditional classroom environment.

FINDINGS: The key ingredient seems to be the facilitation skills of the instructor. More attention needs to be given to the quality and use of visual aids and other visual materials. The use of visual material that is well developed and used properly helps the overall presentation of information because trainees can focus on more than an instructor.

Visuals are also important because they can add variety to a presentation and keep the participants' interest. The expert responses and literature support the use of visual material as a possible enhancement to the information being presented. A focal point for teletraining should be the nature of the content of material presented from a teletraining production and instructor point of view. Dr. Charles seems to sum up these ideas with his response to Question 8. According to Dr. Charles, three areas are of the most concern in the teletraining environment.

1. Process: How training is done.
2. Outcome: Learning and other outcomes.
3. Unanticipated consequences. (10)

The process can be impacted significantly if the visual capabilities of the technology are not used properly to enhance the overall experience. The outcome as a result of using the technology should accomplish the goals that are established prior to starting the

session. With the introduction of almost any new system, unanticipated situations are likely to occur.

Interview Question 9. Question 9 asked, "Do participants get better results in any specific courses? If so, which courses and why do you feel this is the case?"

FINDINGS: Students who are highly motivated and who take engineering, business, nursing, or education courses get the best results. The level of motivation or need on the part of the student are seen as being significant factors relating to student performance. The fields listed in this paragraph have been identified as the courses where student motivation and need have contributed to successful student performance.

Interview Question 10. Question 10 asked, "Within your organization's hierarchy, who is being trained via video teleconferencing technology? Why?" Interview Question 10 dealt with who is being trained via video teleconferencing in the respondents' organization.

FINDINGS: Table VIII provides information on who is being trained and why they are being trained.

Table VIII. Personnel Being Trained in Organizations.

---

<u>Who</u>	<u>Why</u>
1. DOD Employees	Job progression, certification to perform certain tasks. (6)
2. Researchers	Management enhancement series. (10)
3. Secretaries	Trained in various uses of the computer software available for them. (18)
4. Individuals waiting for training in a course with a back log	Travel time, shortage of instructors, and facilities. (36)

---

Summary

This chapter presented the findings for this study. The overall consensus of the experts and the literature search is that teleconferencing technology can be applied to many of the training needs of an organization. Not all organizations have been successful in using teleconferencing, but many have used the technology to enhance their overall training capabilities. Others have used the technology to help employee morale by offering training and other courses that would not have been possible without the use of technology. The next chapter will provide conclusions, recommendations, and some possible future research areas.

## V. Conclusions and Recommendations

### Introduction

The purpose of this research study was to investigate the potential benefits of using AFLC's video teleconferencing network to conduct training called "teletraining." To accomplish this goal, a problem statement was established, investigative questions posed, a methodology was selected, an interview guide was developed, and interview responses were analyzed.

This section presents conclusions drawn from the interview responses and literature review, suggests possible directions for future research efforts, and offers recommendations concerning the use of video teleconferencing in an Air Force environment. Conclusions are presented as they pertain to the investigative questions of this study.

### Conclusions

Investigative Question 1. Investigative Question 1 asked, "What are the potential benefits of using the AFLC VTC network for training?" The first investigative question dealt with assessing the potential benefits of using AFLC's video teleconferencing network to conduct training.

Based on a review of teleconferencing literature and the responses to the interviews, teleconferencing technology provides a medium with the capability to enhance alternate training methodologies. The findings of this research support the assertions that video teleconferencing is a cost-effective and viable alternative method to traditional classroom training. A list of the potential benefits that have been identified by the researcher were provided in Table III. The

benefits are drawn from the expert interviews, literature, researcher observations of the use of the technology at HQ AFLC, and informal information obtained from several individuals encountered during the research process, but who were not formally interviewed. The contents of that table are repeated below:

1. Greater exposure by the students to a more diverse base of experts.
2. More people from a particular office can be trained at one time considering costs, time, travel, and other office management considerations.
3. Interaction/feedback from a larger experience base with more people able to participate than under traditional training circumstances.
4. Less impact on training session because of weather, travel, or other physiological effects.
5. People who might not be trained because of course backlogs can be trained.
6. Site facilitators become more involved with training sessions and develop a good base of knowledge for local personnel to use.
7. AFLC can more fully use the existing facilities to take full advantage of the technology and opportunities presented.
8. AFLC can gain better insight as to how teletraining can impact training requirements.

Support from upper management is absolutely necessary to making the use of new technology smooth, according to the literature. According to Mr. Johansen, "without strong and vocal support of at least one relatively senior manager, teleconferencing does not have a chance of succeeding" (20:165). Support of senior faculty is also needed. A smooth transition from traditional types of training to teleconferencing technology could be suitable to address the issues concerning access to expert knowledge, and training of large audiences. Organizational



attitudes and the direction of the corporation culture are directly impacted by the strategic planning of the executives who set organizational goals. Since training requirements are usually relatively high on the list of priorities for organizations who deem it important to have well-trained personnel, video teleconferencing technology applied to satisfying this requirement would appear to offer some alternative to traditional training methods. Some of the failure factors that are prevalent in teleconferencing were provided in Table II. The contents of that table are repeated below:

1. Did not perform accurate needs assessment.
2. System not promoted internally.
3. Technology unsuited to organizational culture.
4. Performed poor cost-benefit analysis.
5. Wrong timing.
6. Overemphasized travel substitution.
7. No department willing to champion the cause.
8. Technology did not match perceived application.
9. No feeling of "ownership" of the system.
10. No top-down endorsement.
11. Too much comparison to face-to-face meetings.
12. System not easily accessible to potential users.
13. Concept not well understood.
14. System was too project specific - a limited pool of users.
15. Poor facilitation - no commitment to the system, little training.
16. Technology not easy to use.
17. Little or no emphasis on training users.

18. Senior management not involved until too late.
19. System resisted for political reasons.
20. Overseas management (where important) not made sufficiently involved.
21. Wrong first user group.

Investigative Question 2. Investigative Question 2 asked, "How does the quality of training presented via the VTCN compare with the quality of training received at a temporary duty (TDY) school?" The second investigative question dealt with comparing the quality of training presented via the AFLC video teleconferencing network with the quality of training at the TDY location. Video teleconferencing technology used in a training environment, "teletraining," might not be suited for all organizational personnel. Some attention should be given to the audience that is receiving the teletraining. Some form of pretraining screening needs to be accomplished to address the specific needs of a particular target audience. The method of selecting a target audience should be to select those individuals who are positive towards having a teletraining experience. The feedback from these individuals could provide insight to support or negate the idea that motivated students can receive an equivalent training program to that of in-residence training programs.

Courses provided via teletraining facilities need to be selected carefully and the proper audiences matched with the applicable courses. Some courses have been identified as being more appropriate than others for the teletraining environment. Some of the courses that have been identified come from the engineering, nursing, and business fields.

The instructors who are the focal point, or should be, of the teletraining session should have academic and telecommunications backgrounds and some familiarity with the teletraining system being used for a particular session. Faculty should be volunteers for teaching via teleconferencing systems. Each form of teletraining has its own special characteristics and teletraining specialists within an organization can assist instructors with preparing for training sessions. Some organizations, if not most, will have a staff available to help facilitate training sessions.

#### Suggestions for Future Research

1. Some survey instrument should be developed to gain data about the attitudes of Air Force personnel regarding using teletraining to substitute for some of their training requirements. The data could be collected at each site very easily.
2. Data should be collected to analyze how much Air Force personnel know about teletraining and what their opinions are before encountering teletraining as a method of training. These same individuals could be surveyed again after receiving teletraining to find out how their opinions about teletraining have been impacted by actual experience with the alternate method of training.
3. Audience composition data should be gathered and analyzed to further substantiate the impact of using alternate methods of training with individuals who have different motivation levels. Also, some comparison of the types of successful teletraining courses and the student motivation levels might prove useful.
4. Instructors' opinions and attitudes about the use of teletraining should be analyzed for instructors who have had special preparation

for using telecommunications media to conduct training and for those who have not received training prior to using a particular medium.

#### Recommendations

1. Senior faculty and faculty already familiar with teleconferencing technology should form a steering committee to provide policy and other guidance for incorporating teletraining programs into a school's curriculum. Besides top management leadership, leadership is needed from the faculty who will provide the actual training.
2. Further studies on teleconferencing technology should be conducted. Statistical data from users of teletraining could enhance the Department of Defense (DOD) information base to provide the best possible environment for conducting teletraining. Factors that impact trainee performance could be collected from trainees and weighting of the factors could be developed to perform regression and other analyses. As the technology changes and new features are added, data should be collected to analyze the impact of using the new technology in a military setting.
3. Courses could be identified now for a pilot test study to acquire data about the system under training conditions. AFIC should test courses that have proven to provide motivated students who are not biased against using teletraining methods for receiving instruction.
4. Similar to the proliferation of personal computers (PCs) in organizations during the early 1980s, it seems as though a proliferation of teleconferencing systems is on the horizon, and will affect schools such as AFIT. Some form of cohesive and organized method for implementing teleconferencing technology in military organizations needs to be developed and disseminated to all military personnel. A possible

model base program could provide a good environment for testing some of the theories about teletraining as well as start to develop a core of qualified facilitators for operational deployment throughout the Air Force. This implementation is the responsibility of the Defense Communications Agency (DCA) but it appears that most government users do not know who to contact with questions concerning teleconferencing technology. It was the experience of the researcher that several government organizations wanted information about the technology and the primary method for obtaining it was to contact an organization using the technology and ask questions about implementing a system.

#### Summary

The conclusions and recommendations chapter presented some ideas about teletraining and how it should be used in organizations to enhance training capabilities. Teletraining could enhance the overall capability of some organizations to keep highly specialized personnel on the cutting edge of technological advancement in their fields. The costs for providing access to timely information are not as prohibitive as they were in the 70's and early 80's. Moreover, the DOD is expanding its base of facilities and is just beginning to enter the teleconferencing arena on a large scale. The future of teletraining rests with proper and thorough communication between users, increased use of existing systems to address different user needs, good advertisement to all DOD personnel, and top management support.

According to Peter G. W. Keen,

Creating an organizational strategy for telecommunications requires a new style of business thinking among senior managers, who must also have some insight into key aspects of the technology itself. The question is where to start.  
(23:20)

#### Appendix A: Interview Questions

1. How long have you participated in teletraining as a method for conducting formal or informal training?
2. What types of training via video teleconferencing systems have you personally viewed and evaluated?
3. What organizations are you familiar with that use teletraining to train their personnel?
4. Is student progress measured in the same way for teletraining and face-to-face training versions of the same course?
5. In your opinion, does video teletraining enhance or reduce the student retention span?
6. What types of training are suited for video teleconferencing technology?
7. How are instructors selected who will provide teletraining?
8. How do you evaluate the overall training environment of a video teleconference compared to the same training provided in a traditional classroom environment?
9. Do participants get better results in any specific courses? If so, which courses and why do you feel this is the case?
10. Within your organization's hierarchy, who is being trained via video teleconferencing technology? Why?

## Appendix B: Letter to Participants

The attached letter format was used to contact the interviewees after phone contact was made with them about the research. The letters were forwarded with a copy of the interview questions to allow the respondents time to review the questions and prepare responses. Some clarification did take place after the interviewees received the letters and questions. The main concern of the respondents was to clarify whether the research involved looking at teletraining to conduct training or education. The researcher specifically identified that the main thrust of the research focused on using teleconferencing technology to conduct training.

SAMPLE

DATE

Dear

Per our telephone conversation, the attached questionnaire is forwarded for your participation. I am a student at the Air Force Institute of Technology (AFIT) located on Wright-Patterson Air Force Base in Dayton, Ohio. Your assistance with my research effort is important because of the limited number of participants. You were asked to participate because you are very knowledgeable and possibly expert in the area of teletraining. Use whatever format for answering the questions that you prefer, as long as the answers are numbered to match the questions. Please include your title and the name of your organization.

You will be contacted by telephone soon after receiving the questionnaire so that I might answer any questions you may have. It would be greatly appreciated if you could respond by 3 October 1989, using the fax system. The following is my mailing address, telephone number where messages can be left for me, and "fax" number:

Mailing Address: AFIT/LSG [Attn: Capt Stewart]  
Wright-Patterson AFB, Ohio 45433-6583

Telephone: (513) 255-4437 [ Please leave message.]

Fax number: Commercial (513) 255-2791 or,  
Autovon 785-2791

Thank you in advance for your time and effort. I look forward to contacting you again with news about the results of my research.

Sincerely

GREGORY A. STEWART, Capt, USAF  
AFIT/Student



Appendix C: List of Interviewees

1. Mr. John Brolckwell, Director of Satellite Education Programs,  
Fort Lee VA.
2. Dr. Jeff Charles, Senior Research Fellow, Institute for the Future,  
Menlo Park CA.
3. Ms. Margaret Gallico, Administrator of Satellite Education Programs,  
National Cash Register Corporation, Dayton OH.
4. Dr. Vanessa George, Director of Telecommunications Development,  
San Diego State University, San Diego CA.
5. Dr. Ronald G. Heroux, Video Teleconference Center Program Manager,  
Naval Underwater Systems Center, Newport RI.
6. Dr. Michael Moore, Editor, The American Journal of Distance  
Education, Pennsylvania State University, University Park PA.
7. Dr. Richard Snowden, Special Projects Director, Fleet Combat Training  
Center, Atlantic, Dam Neck, Virginia Beach VA.
8. Dr. Nofflet Williams, Associate Dean for Distance Learning,  
University of Kentucky, Lexington KY.

Appendix D: Facsimile and Written Interview  
Responses

Facsimile and Written Interviewee Response  
# 1

Interviewee: Mr. John Broelckwell (U S Army Logistics Management College)

1. How long have you participated in teletraining as a method for  
conducting formal or informal training?

"6 years."

2. What types of training via video teleconferencing systems have  
you personally viewed and evaluated?

"Formal classroom education at the undergraduate level."

3. What organizations are you familiar with that use teletraining  
to train their personnel?

"Army Logistics Management College, Ford, IBM, J.C. Penney, and  
GM."

4. Is student progress measured in the same way for teletraining  
and face-to-face training versions of the same course?

"Yes."

5. In your opinion, does video teletraining enhance or reduce the  
student retention span?

"With interaction, same results."

6. What types of training are suited for video teleconferencing  
technology?

"Procedural, abstract, short courses."

7. How are instructors selected who will provide teletraining?

"No selection process because they teach their functional  
areas. Instructor training course provided to improve  
on-the-air instruction."

8. How do you evaluate the overall training environment of a video  
teleconference compared to the same training provided in a  
traditional classroom environment?

"Equal in ALMC application since course materials, classrooms,  
and instructors are the same."

9. Do participants get better results in any specific courses? If so, which courses and why do you feel this is the case?

"No statistical difference."

10. Within your organization's hierarchy, who is being trained via video teleconferencing technology? Why?

"Those being trained are DOD employees requiring certain courses for job progression or for certification to perform certain tasks."  
(6)

Facsimile Interviewee Response # 2

Interviewee: Dr. Jeff Charles (Institute for the Future/International Teleconferencing Association)

1. How long have you participated in teletraining as a method for conducting formal or informal training?

"10 years."

2. What types of training via video teleconferencing systems have you personally viewed and evaluated?

"Management training, personnel training, employee skills training, computer based training, education courses for upgrading skills."

3. What organizations are you familiar with that use teletraining to train their personnel?

"Over 50% of the Fortune 500 companies do so regularly. Several state agencies, too numerous to mention."

4. Is student progress measured in the same way for teletraining and face-to-face training versions of the same course?

"Sometimes. Often one just evaluates the teletraining end without the face to face comparison."

5. In your opinion, does video teletraining enhance or reduce the student retention span?

"This is not conclusive. It depends on the media. In computer conferencing, for instance, it's impossible to tell. When video is not live it is also."

6. What types of training are suited for video teleconferencing technology?

"See number 2 above."

7. How are instructors selected who will provide teletraining?

"I do not know much about this."

8. How do you evaluate the overall training environment of a video teleconference compared to the same training provided in a traditional classroom environment?

"You concentrate on three (3) things.

- A. Process: How training is done.
- B. Outcome: Learning and other outcomes.
- C. Unanticipated consequences."

9. Do participants get better results in any specific courses?  
If so, which courses and why do you feel this is the case?

Being a consultant, it is hard to answer this question.  
"Tutors can."

10. Within your organization's hierarchy, who is being trained  
via video teleconferencing technology? Why?

"Here at the Institute, no one. Although we participate in  
Management Vision series which is a form of teletraining." (10)

Mailed Interviewee Response # 3

Interviewee: Ms. Margaret Gallico (National Cash Register Corp.)

1. How long have you participated in teletraining as a method for conducting formal or informal training?

"I have been with NCR for nearly three years. I am responsible for arranging the reception of non-NCR produced satellite programs. These satellite programs consist of for-credit graduate courses, and non-credit continuing education seminars."

2. What types of training via video teleconferencing systems have you personally viewed and evaluated?

"I have viewed and evaluated management and professional seminars and technical courses."

3. What organizations are you familiar with that use teletraining to train their personnel?

"Many of the major companies and a number of universities use teletraining. Attached is a list of the companies associated with NTU, the National Technological University."

4. Is student progress measured in the same way for teletraining and face-to-face training versions of the same course?

"Students taking graduate courses through NTU via satellite are graded the same as their counterparts on campus."

5. In your opinion, does video teletraining enhance or reduce the student retention span?

"I think that some of the "magnetism" of the presenter is lost via video teletraining. I feel, therefore, that it's more difficult to maintain the attention span during videotraining. Consequently, special consideration needs to be given to the method of presentation, and to the breaks--both having enough breaks and having them well timed. A "talking head" may get by in the actual classroom, but it will be less than successful for video teletraining."

"All of our credit courses and most of our non-credit courses can be viewed on videotape as well as viewed during the live broadcast. This allows the student to stop and start, rewind and repeat as is necessary to obtain the information-- something that can't be done in a regular on-campus classroom."

6. What types of training are suited for video teleconferencing technology?

"Basically, any kind of training is suitable as long as the appropriate provisions are made at the receiving sites for interaction, facilitation, questions and answers, training equipment, etc."

7. How are instructors selected who will provide teletraining?

"Although I do not personally choose instructors, it seems that instructors are generally chosen for their subject expertise, not their on-camera presentation skills. I believe that consideration should be given to on-camera presentation skills, even if it means that the presenter is not the "authority." (Well known authorities, such as Peter Drucker, do not necessarily present themselves well on camera.)"

8. How do you evaluate the overall training environment of a video teleconference compared to the same training provided in a traditional classroom environment?

"More care needs to be taken to the teletraining studio than the traditional classroom. For example, more care needs to be taken to the kind of visual aids used, how/where the microphones are placed, etc. The focus needs to be on good content and good presentation--from a broadcast point of view. A lot is lost if it's assumed we can just put a camera in a regular classroom and use it for teletraining."

9. Do participants get better results in any specific courses? If so, which courses and why do you feel this is the case?

"I feel that what affects the level of results is the clarity of the presentation and the handouts, and the accessibility of the presenter both during and after the broadcast. Calls should be screened for duplication and they should be taken at a time which does not interrupt the presenter's flow of information."

10. Within your organization's hierarchy, who is being trained via video teleconferencing technology? Why?

"Although there have been programs that have been appropriate for all levels of employees, I would say that the majority of employees trained are the mid-level professionals and managers. The available training is geared to this range. Also, company travel is still perceived as a perk." (16)

Facsimile Interviewee Response # 4

Interviewee: Dr. Ronald Heroux (Naval Underwater Systems Center)

1. How long have you participated in teletraining as a method for conducting formal or informal training?

"6 years."

2. What types of training via video teleconferencing systems have you personally viewed and evaluated?

"Training more in terms of briefings or presentations, plus a computer training course."

3. What organizations are you familiar with that use teletraining to train their personnel?

"Fleet Combat Training Center, Dam Neck, VA."

4. Is student progress measured in the same way for teletraining and face-to-face training versions of the same course?

"I have not done any measurements."

5. In your opinion, does video teletraining enhance or reduce the student retention span?

"I have not tested for this, although some teleconference users tell us that as much (if not more) gets accomplished during teleconference meetings as when the meetings were held in person."

6. What types of training are suited for video teleconferencing technology?

"I would say all types except where field experience is required or hands-on with the equipment, unless the equipment is available at all sites."

7. How are instructors selected who will provide teletraining?

"The same instructors who had done previous on-site training are used and a facilitator is often added at the distant end as required."

8. How do you evaluate the overall training environment of a video teleconference compared to the same training provided in a traditional classroom environment?

"I have not done that."



9. Do participants get better results in any specific courses?  
If so, which courses and why do you feel this is the case?

"I have not done any testing in this area to say, except to mention that a (not very understandable, will call for help)."

10. Within your organization's hierarchy, who is being trained via video teleconferencing technology? Why?

"Secretaries were trained in various uses of the computer software available for them. All sites had computer terminals on the table for hands-on use and a facilitator was at the site where the instructor was not at." (18)

Facsimile Interviewee Response # 5

Interviewee: Dr. Richard Snowden (Fleet Combat Training  
Center, Atlantic)

1. How long have you participated in teletraining as a method for conducting formal or informal training?

"6 months - formal training."

"1 year - informal training."

2. What types of training via video teleconferencing systems have you personally viewed and evaluated?

"Business, University, other DOD users. Non-secure and secure. One-way video with two-way audio and two-way video with two-way audio."

3. What organizations are you familiar with that use teletraining to train their personnel?

"All Navy locations, and some Army and Air Force locations."

4. Is student progress measured in the same way for teletraining and face-to-face training versions of the same course?

"Yes."

5. In your opinion, does video teletraining enhance or reduce the student retention span?

"No."

6. What types of training are suited for video teleconferencing technology?

"Mostly soft skill courses; however, we are starting to do maintenance courses at present."

7. How are instructors selected who will provide teletraining?

"Any qualified Navy instructor."

8. How do you evaluate the overall training environment of a video teleconference compared to the same training provided in a traditional classroom environment?

"Students would rather have instructor in room. Learning scores are about the same and often the remote class has better scores."

9. Do participants get better results in any specific courses?  
If so, which courses and why do you feel this is the case?

"See answer for Question # 8."

10. Within your organization's hierarchy, who is being trained  
via video teleconferencing technology? Why?

"Consideration should be given to courses with a back log.  
Further consideration should be given in the following areas:

- A. Travel time/expense.
- B. Standardization.
- C. Shortage of instructors and facilities.

The training is applicable to admirals, all others to  
include civilians." (36)

Facsimile Interviewee Response # 6

Interviewee: Dr. Vanessa George (KPBS-TV San Diego, CA)

1. How long have you participated in teletraining as a method for conducting formal or informal training?

"Seven years."

2. What types of training via video teleconferencing systems have you personally viewed and evaluated?

"The university teletraining courses have covered several disciplines over the past seven years; from Humanities to Computer Sciences and Engineering. The ad hoc teleconferences have dealt with medicine, insurance, education, law enforcement, and many other areas. I do not personally view or evaluate courses."

3. What organizations are you familiar with that use teletraining to train their personnel?

"There are over 60 companies with private satellite networks which are used for training. I believe you have the list from Elliot Gold of Telespan. About 1000 hospitals are members of Hospital Satellite Network which provides 24 hour programming: 12 for patients; 12 for training and education."

4. Is student progress measured in the same way for teletraining and face-to-face training versions of the same course?

"I think this true of the university courses. The training takes place simultaneously: some students are in the TV classroom; some students are at distant sites."

5. In your opinion, does video teletraining enhance or reduce the student retention span?

"I prefer that you check the research data on this. Since I do not teach and grade students, it is difficult to put forward my own opinion with much conviction."

6. What types of training are suited for video teleconferencing technology?

"Virtually any type of training is suited. If you teach a large audience in a lecture hall, you may teach, via teleconferencing, to a large audience comprised of several small audiences at various sites. You may also conduct a seminar with a few people via teletraining. At issue is the cost effectiveness of training a few persons or a large number of persons when the technical costs remain similar."

7. How are instructors selected who will provide teletraining?

"At the university, this is a departmental decision. Some of the deciding factors are availability of instructor, subject... need to call of remaining info...."

8. How do you evaluate the overall training environment of a video teleconference compared to the same training provided in a traditional classroom environment?

"The quality of the environments of both vary. In either case, the environment may be a comfortable theater with air conditioning, agreeable companions, and a good view of the instructor who you can't hear anyway."

9. Do participants get better results in any specific courses? If so, which courses and why do you feel this is the case?

"If by participants you mean students, my opinion would be that motivation and need influence this strongly. I suggest you consult the research on Instructional Television which is considerable."

10. Within your organization's hierarchy, who is being trained via video teleconferencing technology? Why?

"I am unable to answer this question with specificity. Various parts of the university make use of ad hoc television from time to time. Members of the hierarchy could be using teletraining and I might not know. However, I don't think that is the case." (17)

Mailed Interviewee Response # 7

Interviewee: Dr. Michael Moore (Editor, The American Journal of Distance Ed.)

1. How long have you participated in teletraining as a method for conducting formal or informal training?

"About twenty years."

2. What types of training via video teleconferencing systems have you personally viewed and evaluated?

"Higher education."

3. What organizations are you familiar with that use teletraining to train their personnel?

"Universities."

4. Is student progress measured in the same way for teletraining and face-to-face training versions of the same course?

"Yes."

5. In your opinion, does video teletraining enhance or reduce the student retention span?

"The medium is far less significant than other variables such as content and learner characteristics."

6. What types of training are suited for video teleconferencing technology?

"The more educated, experienced, and sophisticated the trainee, the more suitable is teleconferencing."

7. How are instructors selected who will provide teletraining?

"Selection is usually random."

8. How do you evaluate the overall training environment of a video teleconference compared to the same training provided in a traditional classroom environment?

"The medium is not the significant variable. Far more important is the nature of the learners, the nature of the content, the size of the classes, the frequency of meeting, and the facilitation skills of the instructor."

9. Do participants get better results in any specific courses? If so, which courses and why do you feel this is the case?

"Again, what is most important is the facilitation skills of the instructor."

10. Within your organization's hierarchy, who is being trained via video teleconferencing technology? Why?

"There is a self-selection on the part of professors who are interested in using technology." (29)

Facsimile Interviewee Response # 8

Interviewee: Dr. Nofflet Williams (University of Kentucky)

1. How long have you participated in teletraining as a method for conducting formal or informal training?

" Since 1974."

2. What types of training via video teleconferencing systems have you personally viewed and evaluated?

"Beginning in 1974, I was involved in the use of NASA experimental satellites to deliver credit graduate courses to 15 sites in 8 Appalachian states. The network expanded to 46 receiving sites in 13 Appalachian states in 1977. The programming included credit courses, short courses, workshops (video conferences) in education, engineering, nursing, and business."

"From 1981 to the present, I have been telecourse administrator for U.K. which enrolled more than 2000 students during 1988-89 through Evening-Weekend College and Off-Campus Programs. U.K. uses cablecasting; learning centers and public libraries; is a member of the Kentucky Telecommunications Consortium which uses ETV open air broadcasts; and uses The Learning Channel's (TLC) satellite broadcasts to satellite dish owners and cable systems."

3. What organizations are you familiar with that use teletraining to train their personnel?

"The National University Teleconference Network (NUTN), PBS/Adult Learning Satellite Service (PBS/ALSS) and Community College Satellite Network (CCSN) are devoted to Continuing Professional Education and staff development programming. KET, The Kentucky Network, Oklahoma State University and TI-IN Network in Texas provide high school credit courses in math, science and foreign language."

4. Is student progress measured in the same way for teletraining and face-to-face training versions of the same course?

"Yes, a site coordinator administers the tests which can be mailed to or be sent electronically to the instructor."

5. In your opinion, does video teletraining enhance or reduce the student retention span?



"Usually, students are highly motivated and can be expected to perform at or above the level of traditional students."

6. What types of training are suited for video teleconferencing technology?

"Courses that require extensive laboratory or clinical activities are the most difficult to deliver. A very large percentage of teletraining activities can be delivered by video or audio."

7. How are instructors selected who will provide teletraining?

"Usually, instructors are encouraged to volunteer to participate. I am enclosing one article on training instructional television faculty and a faculty manual for distance learning faculty."

8. How do you evaluate the overall training environment of a video teleconference compared to the same training provided in a traditional classroom environment?

"Students and faculty can be asked to complete survey forms to determine the acceptability of the environment. Questions can be included asking the student to compare the traditional classroom environment to the teletraining environment."

9. Do participants get better results in any specific courses? If so, which courses and why do you feel this is the case?

"Engineering, business, nursing, and education in that order seem to work well. Students in these areas are highly motivated and the quality of television does not have to be as high."

10. Within your organization's hierarchy, who is being trained via video teleconferencing technology? Why?

"Most of the teletraining at this time, outside the television courses for credit, is imported by satellite. Engineering, student services, business, allied health, security personnel, agriculture personnel and educators are some of the people that benefit from the teletraining. We have recently added an uplink and expect to train pharmacists, educators, engineers, health personnel, etc. in the state of Kentucky. Satellite and ITFS delivery systems allow information to travel to citizens of Kentucky." (42)

MEANS AND STANDARD DEVIATIONS OF QUESTIONNAIRE ITEMS

<i>question</i>	<i>mean</i>	<i>std. dev.</i>
1.To what extent did the telecommunications affect your opportunity to ask questions?(1-very little, 7-a great deal)	3.78	1.83
2.To what extent did you feel comfortable with the lack of nonverbal feedback from the instructor?(1-very uncomfortable, 7-totally comfortable)	4.30	1.14
3.How did teleteaching affect your willingness to ask questions?(1-very encouraged, 7-very discouraged)	4.43	1.61
4.Were the teleteaching sessions more or less organized than the traditional sessions?(1-a great deal more organized, 7-a great deal less organized)	4.39	1.03
5.How was class time spent in the teleteaching sessions compared to the traditional sessions?(1-much less effective, 7-much more effective)	3.60	1.07
6.How dominant was the instructor in the teleteaching sessions compared to the traditional sessions?(1-much more dominant, 7-much less dominant)	4.78	0.99
7.How did the class structure affect the cohesion of the students in the class?(1-much more cohesive, 7-much less cohesive)	2.60	1.15
8.How valuable was the use of the graphics on the monitor screen used by the professor?(1-very effective, 7-very ineffective)	4.21	1.50
9.How clear was the voice transmission with the telecommunication system?(1-very clear, 7-unclear)	2.21	1.20
10.Did you feel more or less stimulated in class as a result of teleteaching?(1-more stimulated, 7-less stimulated)	3.34	1.55
11.How comfortable were you with the system the first time you used it?(1-very comfortable, 7-very uncomfortable)	4.13	1.84
12.Did you become more or less comfortable with the system after it was used several times(1-great deal more comfortable, 7-very uncomfortable)	2.52	1.53
13.How would you rate the overall effectiveness of teleteaching compared to the traditional approach as a learning tool?(1-very effective, very ineffective)	3.08	1.62

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3 Rising costs for conducting training in support of the Air Force mission could result in compromising the readiness of personnel. With limited resources and spending priority conflicts, Air Force managers seek solutions offering reduced costs, improved productivity, and increased employee job satisfaction. Based on new technological advancements in the field of teleconferencing, and the proven benefits/results from limited use of teleconferencing technology, a new/alternative method for conducting training, "teletraining using teleconferencing technology," appears to offer a partial solution to social, cultural, economic, productivity, and other organizational problems associated with fulfilling/addressing organizational training requirements.

Teleconferencing can be defined as an altered communication environment where employees/personnel are trained at a centralized site with communication taking place via electronically transferred data, images, and other graphically represented material using teleconferencing technology. Teleconferencing technology has several successes as well as failures associated with its use in government and private organizations.

This study investigates the perceptions of government and private sector telecommunications professionals concerning teleconferencing's applicability to teletraining in general. The quality of teletraining was compared to the quality of traditional face-to-face training environments. Mail, facsimile, and telephone interviews of knowledgeable telecommunications professionals who are considered to have expert knowledge as well as a thorough literature search were conducted.

Interview and literature search results concluded that teletraining via video teleconferencing is a viable alternative to traditional classroom training as long as the audience and instructor are familiar with the pros and cons of the technology.

Recommend implementing a pilot study for testing a teletraining program at AFLC/HQ. Also recommend development of a survey to collect additional data from personnel who use teletraining or the video teleconferencing network.

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